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Agriculture is the nursing mother of the Arts. [XENOPHON. | Tillage and Pasturage are the two breasts of the State.—SULLY.

J. E. WILLIAMS, EDITOR. AUGUST & WILLIAMS, PROP'RS.

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For the Southern Planter.

Notes on the Cane-Brake Lands—or the Cretaceous Calcareous Region of Alabama.

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The calcareous lands of southern Alabama offer, in their agricultural and obvious characteristics, a remarkable contrast to all the lands of the Atlantic slope of the United States. The contrast will appear still stronger, when the comparison is extended to the chemical qualities of the soils, and to other peculiarities not generally noticed, or open to the cursory observation of strangers and visitors, or even known to old residents and practical cultivators. More than twenty years ago, when this was a new settlement, but little known except to the residents, and when neither this nor any other new or western state had been visited by me, I was so much interested in the reports of this region, that I endeavored to investigate its peculiarities and their causes, and presumed then to publish my views of the remarkable soils and other peculiarities of the country, and to account for their existence, in an "Inquiry into the causes of the Formation of Prairies, &c." (Farmers' Register, vol. iii.)* It was not until very lately, (in May, 1858,) when making a first and short visit to Alabama, that, (induced by the kind invitations and attentions of sundry planters to whom I had until then been personally a stranger,) I used the offered facilities to examine some of these lands—and to test my previous views by personal observation, and also by the best information to be obtained from residents. Whatever has been thus learned, whether in confirmation of my early views and reasoning, or in correction of former mistakes of myself or of others, will now be submitted, as a sequel to, and commentary on my several former publications on this general subject.†

* Two later and enlarged editions of this article have been published since—the latest in my "Essays and Notes on Agriculture." (published by J. W. Randolph. Richmond, 1855.)

†I had much cause for regret that this sudden and hurried visit to the cane-brake lands had not been foreseen, and prepared for by me, by previous reference to and noting of sundry publications on this subject in the "Farmers' Register," by residents or proprietors, and founded on actual observation, as well as my own extensive comments on and deductions from such writings of others. Much as this subject had formerly engaged my attention, and labor of investigation, more than twenty years had afterwards passed, when the first and unexpected opportu-

The whole of the Atlantic slope of the United States, so far as I have been enabled to examine, and to study by analogy and inference, differs from the best known cultivated lands in the old world, in the remarkable fact, that all these soils of eastern America are naturally and entirely destitute of *carbonate of lime*, or of that most usual combination, or form, of lime which is so common, and often so abundant, in most of the longest known and formerly described soils of England and France. Indeed, so common was this ingredient of soil in Europe, and often so obvious to the eye, (either as chalk or limestone,) that, in the general ignorance of agriculture as a science which prevailed even as late as fifty years ago, it was a general and undisputed belief that all soils contained lime in this form. And, as all English agricultural opinions were then readily received by the few American readers, and applied, without examination, to this country, it was not questioned here, but fully admitted, by the few who then had cast a thought on the subject, that the soils of the old States of this Union were also generally or universally supplied with more or less of carbonate of lime.* It was nearly forty years ago, that I first came to believe, and then asserted, and soon after published, the then entirely novel fact of the general (and almost universal) and entire absence of *carbonate* of lime as a natural constituent of the soils of our Atlantic slope, which (and but a small part of that) was the only portion of the whole country with which I was then the least informed by personal observation, or other information. No scientific inquirer had before even suspected this remarkable fact. But every correct scientific observation, made in later times, has served to confirm my then unsupported position. Even the mountain "limestone lands," showing frequently at the surface compact rock of nearly pure carbonate of lime, were not exceptions to the rule of the absence of that ingredient as a constituent of soil. The soils surrounding or overlying these rocks, and even in contact with them, very rarely contained the smallest portion of carbonate of lime, of which lime-stone consists almost exclusively. There were only a few and limited cases of such soils, probably from accidental, and certainly rare causes of dis-

nity occurred of my seeing these or any similar lands. In all that time the subject was off my mind, and never expected to be resumed. It may then be believed, even by those who do not know the fact that my memory is greatly impaired by age, that I had entirely forgotten many particulars which I had formerly studied and published, and partly of my own writing, when this first opportunity offered to test and verify my opinions formed and presented so long ago. And when going to another part of Alabama, being still without intention of visiting the calcareous region, or giving any time to personal explorations, I did not carry with me, and could not there procure, for reference, any of my former publications, or any other, on the subject. Even the very necessary and very portable aids of a thermometer and a pocket map of the country I could not obtain, after the need for them was presented.

While in Marengo county, I heard that the lately deceased Professor Tuomey, the State Geological Surveyor, had visited and examined this region, and that the report, made up from his papers, had not been then printed. From my knowledge of the great ability and industry, and fidelity to every trust and duty, of this zealous and successful votary of the natural sciences, I expected that his labors would supply much, on geological and chemical questions, that I was not qualified to investigate thoroughly. Therefore, in addition to other reasons for delay, I withheld this article from publication, until after the publication of the second and last report of Professor Tuomey's Survey—which was made late in 1858. Much earlier, I had read what he said on the calcareous lands in his first report, published in 1850. But the little there embraced on this subject had also left no impression on my memory—and I could not again have access to this first report, until when the last appeared. The lamented death of the author had doubtless served to cause many important omissions in this portion of his subject which, if he had lived, would have been fully and well supplied. And besides other stated omissions, of parts either not written or lost, his editor, Prof. J. W. Mallet, states that "at least one additional chapter 'On the results of the Geological Survey in their application to Agriculture' was included in the design of Professor Tuomey's Report—but of this no manuscript has been found."—(p. 168.) This chapter, if it had been prepared, would probably have contained much of the particular observations which I sought in vain in what is left to the public of Professor Tuomey's latest and always valuable labors. Of the comparatively little that his reports furnish in regard to the agricultural characters of the cretaceous bed and soils, I will add, in notes, with due acknowledgement of the source, some information, additional to mine—and also acknowledge some matters in which our deductions, or opinions of facts, are opposed.

* This particular subject was first and fully discussed in the Essay on Calcareous Manures, and in all the editions, from first in 1821 to fifth in 1853.

integration and admixture of portions of the adjacent rock, which were slightly impregnated with carbonate of lime. And so, and much more abundantly supplied, were some small spaces of soils in the tide-water region, where marl-beds cropped out at the surface, or elsewhere, that oyster and mussel shells had in ancient times been accumulated by the Indians, on the sites of their former villages. But with these few and small exceptions, (scarcely deserving to be mentioned as such,) to the general rule of entire absence, there was no *carbonate* of lime in any known specimen of natural soil of the Atlantic slope of the United States.

Before proceeding farther, to prevent misconstruction and mistake, I beg that I may be understood as maintaining (as to these or any other lands) the absence of lime in its most usual and abundant form of *carbonate* only—and not of *lime generally*, and in every other form of combination than the carbonate. On the contrary, (and as I have always maintained,) some small portion of lime, and in some other combination most generally, exists in every soil that is the least productive of perfect vegetable growth —and this lime ingredient is generally larger in the richer soils. But it is also true, and important to be noted, that generally, whenever lime as the *carbonate* is entirely absent, it is rarely present in any other form of combination in sufficient quantity for the wants and highest fertility of the soil, and for its best subsequent improvement; and that it is especially deficient, in any and every form of combination, throughout the whole Atlantic slope, in all naturally poor soils.

After having been fully impressed with these views, it was, at a later time, a new subject for surprise to me to learn, as I did, first by report, and next by partial analyses of many hard specimens, that a large extent of the soils of the Gulf slope, in Alabama and Mississippi, not only contained carbonate of lime in large proportion, but that the too great quantity in many cases had already been injurious, and, as I inferred, in many more cases, was likely to produce future impoverishment and sterility. To this excess of carbonate of lime I then ascribed, and still ascribe, the absence of trees on the true prairies, or what were there termed the "bald prairies" of Alabama and Mississippi; and the much more extended observations of travellers and residents, in later times, and in the more western and southern territory west of the Mississippi river, and in Texas, have served to prove, by numerous facts, positions which I had formerly asserted mainly upon inference and reasoning. I will not here repeat my former argument, nor adduce new evidences of what was then correctly inferred and maintained. My present purpose is to describe, upon the surer ground of personal observation, and by correction of the mistakes of residents, the distinctive and peculiar agricultural features of this remarkable region.

For my first invitation, and facilities offered for my examinations, I was indebted to the liberal courtesy of Col. Charles Pollard, President of the new Montgomery and Pensacola Railroad, which was then completed from Montgomery for about 30 miles into Lowndes county, and mostly through the former "prairie" or calcareous lands. A special train was sent to convey me and a number of other invited guests, and placed at my order, to travel slow, and to stop when desired, so as to enable me best to see the bordering lands. Afterwards, on the invitation of Col. James L. Price, President of the Alabama and Mississippi Railroad, I passed over that road, from Selma to near Union Town; and by his hospitable attention and aid, and that of Richard H. Adams, esq., of Marengo, especially, I was enabled to see and learn much of the lands of Perry, Dallas, and Marengo.

The central and most marked portion of the calcareous region of Alabama is in Marengo; and that, more especially, was formerly known, and is still commonly referred to, as the "cane-brake land." But the same general qualities, and also that general designation, extend to all the neighboring and surrounding country. The soils of the region in question are caused to be generally calcareous, by the out-cropping there of the cretaceous lime-rock. This cretaceous region is a broad belt, extending across the state from east to west, (and further stretching into both Georgia on one side and across the state of Mississippi on the other,) and lying somewhat southward of the middle of Alabama. Still farther south, this cretaceous bed disappears below the there highest of tertiary eocene marl—which is even more highly calcareous than the former—and from its description, seems to be of the same character of the "Great

Carolina Bed" of *Eocene* of lower South Carolina. This is merely mentioned here to prevent any of my remarks being applied to this more southern or eocene marl region, which, in Alabama, I did not visit. The region of the exposed cretaceous formation includes, wholly or in part, the counties of Russell, Barbour, Macon, Montgomery, Lowndes, Willcox, Dallas, Perry, Marengo, Sumpter, Greene, and Pickens. When the first settlements of Alabama were begun, in 1817, nearly all this broad space was covered by a thick under-growth of cane, which was the more dense and tall in Marengo. The cane is very like the reed of lower Virginia, and not readily distinguishable from it by cursory observation. But those persons who are well acquainted with both plants, know the differences. The cane not only grows to much larger sizes, (under the favorable conditions of rich soil and warm climate,) but it also covers, and flourishes on, high and dry, as well as moister lands; whereas the reed grows only on very wet and swampy ground. When the first white pioneers and settlers entered this region, they could scarcely penetrate through the close and general covering of cane on the calcareous and richest land. And at a later time, the most frequented roads through the richest lands were covered across by the leaning and overhanging and interlocked tops of the tall canes, growing on each side, rendering the passage of travellers slow and difficult. Tall trees over-topped the cane growth everywhere, except on the comparatively small spaces of "bald prairie." There are now but few and scant remains of this former general dense cover of tall cane—and only in such spots as, from some accidental causes, have not been cultivated, and yet, being enclosed, are protected from the access of grazing animals. The leaves of the cane furnish excellent food for cattle, and through the winter. Therefore, the numerous cattle introduced and kept by the white settlers, in the course of time, have destroyed and kept down the growth of cane in the woods and grazing waste lands, as cultivation has eradicated it on the enclosed fields.

The only water, then, to be obtained in summer, was in a few ponds, or small lakes, which have dried up since the general clearing and tillage of the country, and in the small detatched and temporary pools along the bottoms of what had been water-courses in winter, supplied by surface rain-water only, and which ceased to be streams through all the dryer and much longer portion of every year. The scarcity of water forbade the Indians making this region a continuous dwelling-place, or even a long continued camp—and this scarcity presented the greatest obstacles to settlement, and was the cause of long, continued suffering—before being removed—to the earlier white settlers, many of whom still dwell on their earliest clearings, and remember well the former want of and suffering for water.

The great distinctive feature of this "cane-brake," or calcareous region, is the universal under-bed of soft and very rich calcareous rock, or hard marl, which sometimes is very near to, or actually exposed at the surface, and more generally is to be reached at a few feet below the surface—and is found almost everywhere within fifteen or eighteen feet. The upper layer of this rock is usually, but not always, the softest, and may be considered as a rich compact marl—not too hard to be dug easily. This is of a dingy, yellowish white color. Below this, and usually within a few feet of the surface of the higher, is a universal bed of still more compact marl, or soft marlstone, of very uniform texture and other characters. This is bluish when moist in its bed, and nearly white when dug up and exposed to dry air. Though very compact, and much more difficult to dig, yet when exposed on the surface to the air and rains, this disintegrates completely, and, in one or two years, becomes in texture a finely reduced earth. This compact bed of the lower marl or soft limestone, along its northern border, thins out until it is lost, the inferior bed there rising to and occupying the same face. But as proceeding southward, the cretaceous rock becomes thicker, and is nearly, if not exceeding, 1000 feet where thickest and near the southern line of its surface exposure. The numerous Artesian wells have to pass through this solid bed to obtain water from the sand beds below; and therefore the depth of the bottom of the cretaceous marl has been ascertained in many places, and throughout nearly the whole region. Thus it has been learned that the general gentle dip towards the south, is by no means regular, and the under surface of the cretaceous bed is a plane far from uniform. At Selma, borings of 400 feet bring up water—while in a more southern part of

the same county, Dallas, at 760 feet, the bottom of the marl had not been reached. The present upper surface of the bed, (formed by ancient denudation, and forming a very acute angle with the plane of the under side, is much more nearly horizontal, but still dipping, or sloping downward towards the south and gulf coast. The extent and character of this thick cretaceous bed are enough to explain the causes why there should be neither natural springs nor streams in all this country; and also, why, with very clayey and close-textured surface soils and sub-soils, that every considerable rain should render the ground very wet, and a universal adhesive mire, from which the absorbed superfluous water can escape only by the slow process of evaporation. This latter quality, the effect of an extremely clayey and impervious soil, is the great evil of this otherwise highly favored region. After spells of rain, and during all winter, the roads are almost impassable by wheel-carriages, and the dryest ground is scarcely fit to walk upon. The wheels of carriages, on the roads, would be soon completely enveloped by a tough adhesive mud, usually as black, and almost as sticky as pitch, so that without continual cleaning the mud from the wheels, they would soon be entirely covered and rendered immovable. And walkers would find the load of mud on their feet, increasing at every step, the most effectual of shackles to forbid voluntary exercise on foot. Such conditions of the soil and roads, I learned only by description, except so far as seeing the indications from the very marked effect of one hasty and light shower of rain on a before very dry surface, which, for a few hours, made walking difficult and disagreeable. But there can be no question of the great inconvenience, annoyance, and actual great loss, in winter, from this peculiar condition of the land, being worse than any person elsewhere and without information, could ever conceive to be possible.*

* The "cane-brakers" deny, and treat as a calumnious charge of out-siders on their fine country, that it is usually necessary to scrape the masses of adhering mud from the feet and legs of the chickens, to enable them to walk. But it is admitted that it is necessary to cut off every pig's tail, because if left of its natural length, it would soon collect on the end, a ball of mud which often becoming dry and hard, would be a permanent appendage of great annoyance to the wearer, and more like a "slung shot" than a natural tail.

The earliest white inhabitants, finding no springs or permanent streams, dug shallow wells or pits in the low and dampest spots, which were sunk a little into the blue lime-rock. In wet weather, the rain-water, that could percolate so low, "seeped" or oozed into these excavations, and so furnished a scant and uncertain supply of very bad water for drinking. The like diggings, made much broader, (sometimes 40 to 60 feet across,) and with an inclined sloping passage-way from the surface, (and with connected ditches also to bring in surface rain-water,) are still used to supply water to the live-stock on many plantations. This "seeping" water is merely so much of the rain-water as had previously and slowly and with much difficulty, filtrated through the very close upper bed of clay, mostly black with the large impregnation of vegetable or other organic matter, which communicated a disagreeable flavor to all such water. But for drinking, and all other domestic uses, (other than for live-stock, and sometimes for them also,) there are now usual and abundant supplies of rain-water, collected from the roofs of the buildings, and conducted into underground cisterns, which are excavated in the compact blue lime-rock. The opening into these cisterns is like that of a small ordinary well. But when reaching the firm calcareous bed, the digging is widened on all sides, as much as may be desired for abundant capacity; and the firm texture of the lime-rock prevents any danger of the overhanging top falling in. A side apartment, is in some cases extended laterally, with a horizontal ceiling, to serve for a refrigerator, to keep milk, butter and fresh meats in. Into these subterranean excavations, very little of outer or upper water penetrates by percolation through the overlying and surrounding firm marl, or soft but solid cretaceous rock. These cisterns, or underground galleries and small apartments, could not be more permanent, or safe, for their designed uses, if hewn out of solid marble. As all communication with the open air cannot be avoided, mosquitoes, though otherwise few in number, and of but slight annoyance, would find their way to, and if not prevented, breed in numbers in the water of these cisterns. This however, is counteracted by placing in them a few small fish, which consume all the eggs and *larvæ* of the mosquitoes.

But the most convenient and abundant

supply of water, (though not always free enough from mineral impregnations to be used for drinking,) is now obtained by boring through the thick bed of lime-rock, and reaching below it a sand-bed full of confined water, which rises through the new passage thus afforded, and usually to above the surface of the earth. These bored (or Artesian) wells have been very generally resorted to, and found available everywhere except about Union Town, the most elevated surface of the neighbouring calcareous region. There, as it is now supposed, though the confined under-water can be always reached, and will rise up, it cannot rise high enough to flow off above the surface of the bed—which is the great object and value of this mode of supply. Everywhere else, water has been thus obtained, and usually in jets of the full size of the bores; and, as it seems, so far, may be obtained in any desired quantity. At Selma, on the very high bluff, or bank of the Alabama river, on which the town is built, a very large Artesian well, with the aid of some accumulation of its water, is used, to turn an over-shot wheel, which, whenever needed, works machinery to hoist goods from the river steamers to the store-houses. And, (as I was told) on a plantation in Greene county, the streams from several adjacent bored wells, united, served as constant water-power to propel machinery for grinding corn, ginning cotton, sawing plank, &c., to good purpose and profit. The peculiar texture of the great calcareous bed, which is easy enough to penetrate with the auger, and yet so firm as to require no tubing to preserve the sides, or prevent the filling with earth, offers very unusual facilities for this great improvement. So important and convenient are these bored wells, that they are made, and in some cases even to depths between 700 and 800 feet, near the southern outline of the cretaceous belt, in places where other and abundant supplies of water are already obtained, or are available, from shallow sources, or from veins of springs passing in the higher sandy beds above the marl-bed. This character exists only where sandy or non-calcareous beds of considerable depth and also lateral extent, lie upon the calcareous bed. And such lands (though like others, everywhere underlaid, at great depth, by the marl,) are not understood either in common parlance, or in these remarks, as of the "lime-land" region, or of their peculiar character. This term, or understanding, is confined to localities where the marl-bed frequently rises to or very near the surface, and is no where absent at many feet below.*

The soils of the "cane-brake" on the generally calcareous region, are various—but all are greatly deficient in sand, or silicious parts, for proper or desirable pervious texture, and all are excessively and injuriously supplied with fine clay. Also, the greater number of soils, and the greater extent of surface, are much too profusely furnished with carbonate of lime. But also there are other portions frequently occurring, and in large proportion too, which are entirely destitute of *carbonate* of lime—and some of them, (as I believe,) are very deficient of lime in any form of combination. Wherever the lime or marl rises to the surface, and makes the largest constituent part of the soil, no trees formerly grew—and the land is poor, and nearly barren where the lime is most abundant. But with all these objections, and defects of constitution, the land, from tillage and production, suffers less from too great wetness, (or long retention of too

* Professor Tuomey says, "The water of nearly all I have examined is more or less highly charged with salts of lime, magnesia, soda and iron, and in some instances, it is impregnated with sulphur." (First General Report, p. 138.) The saline ingredients vary in different springs—but all are such as, if of rare occurrence, would elsewhere be termed and perhaps used as mineral or medicinal waters. (p. 139.) "Persons accustomed to this water, like it, and cattle prefer it to every other." . . "The temperature of the water, as it issues from the spout, increases nearly with the depth of the well; but of course this gives only the mean temperature of all the water that flows into the well, and not that at the bottom [alone]. The want of uniformity in the results obtained is doubtless owing to this cause; and these results are, therefore, only offered as a coarse approximation.

"*Temperature of the wells examined.*"

	Depth, feet.	Temp.
"Well at Finch's ferry,	173	64°
Do. near mill,	193	66°
Dr. Withers' mill [Greene,]	285	64°.30′
Do.	360	65°
Boligee,	415	68°
Dr Withers' mill,	420	66°
Do.	468	66°.30′
Cornfield, Boligee,	522	70°
Capt. Johnson's,	560	71°
Dr. Perrin's	544	72°

"Taking wells of greatest and least depth, and comparing the temperature, it appears that the rate of increase is equal to 1° Fahr. for every 55 feet." (p. 140, 141.)

much rain-water,) and also from long drought and great dryness of the soil, than could be conceived in advance of experience. And the extreme close and clayey texture does not forbid very easy and good tillage, and consequent good tilth of soil—and the land is generally very productive, and the locality, in general, very healthy—though the reverse of all these conditions would have been inferred from the mere statement of the natural features and constitution of the land. And all these benefits and qualities, so different from what would have been anticipated, are owing to the highly calcareous character of most of the surface, and of the whole of the under lying beds.

The surface of this whole region, (with the few exceptions of alluvial bottoms,) is everywhere undulating, and generally enough so for the tilled and finely pulverized soil to be washed off, very injuriously, by heavy rains, on some parts of every field. Yet the slopes are rarely steep enough anywhere to be called hilly. Nor would such washing occur under a different course of culture, or alternate cropping, in which broad-cast crops, and grass, &c., made parts of a varying round of crops, instead of the now increasing and almost unvarying tillage of cotton and corn. It is this continual tillage, and especially of cotton, which demands a perfectly pulverized and loose and clean soil, that causes the ruinous impoverishment, and mainly by washing, of the more southern states generally; and which has caused great damage even on these peculiar lands, which, by their constitution, are especially fitted to withstand the washing effects of rain. Formerly, here, as everywhere else, there was no care used to prevent or lessen their evil effects. The ploughing was in one uniform direction throughout each field, and in straight rows, and of course up and down the faces of many of the slopes. Of course, with all the land kept tilled every year, and two-thirds of it under cotton culture, no soil could be otherwise than greatly washed and wasted. It was only owing to the peculiar calcareous constitution, and the great depth of the fertile soil here, that the whole country was not utterly destroyed by washing, as has occurred on so much of the rolling lands of middle Georgia, where the same causes and neglect prevailed, without the existence of the partial safeguards of the Alabama cane-brake lands. In latter years, graduated or guard ditches on all the sloping surface, with horizontal rows and ploughing in the intervals between the ditches, have generally been adopted by all good planters—and these, when well placed, and kept in order, seem to be sufficient safe-guards against the further extension of the former injurious washing of the fields, even under the usual continual succession of tillage crops.

The surface of the arable land, as exposed to the eye when newly ploughed, (and before being hidden by the growing crop,) is everywhere spotted with different shades of color, from black to yellowish and white. The black soil (including the darkest gray,) is known as "prairie land;" and of this class, when the lime-rock rises nearly or quite to the surface, it makes the ploughed layer nearly white. The yellowish and reddish portions, intervening with the former, are known as different varieties and grades of "post-oak land." These latter comprehend all the various tints and alternations of brownish, yellowish and reddish soils, all dull and imperfect tints, for these different descriptive terms. The extents of space of all these differently colored soils are from less than an acre to ten or more acres together. More rarely, some one kind, and more frequently of the black, extends for hundreds of acres together. Very different agricultural qualities and values belong to these different varieties of soils. Still, as I was informed by sundry intelligent planters, all these different soils were supposed, by all the residents, to have the common property of being highly calcareous. Indeed, I did not hear an opinion to the contrary, or even a doubt. Further, to establish this proposition, which my first personal view caused me to doubt, my own testimony (as supposed) was quoted against me—and I was told that in my former published report (in Farmers' Register,) of hard-specimens analyzed by myself, I had stated that the "post-oak" soil contained 25 per cent of carbonate of lime. Since returning home, and being enabled to refer to my former report, I find that this supposition was a mistake. The only two specimens of "post-oak" soil formerly sent to me, I had reported, (vol. III. Farmers' Register,) to contain not a particle of carbonate of lime. When having the advantage of the much more correct indications afforded by personal inspection of numerous soils, in place, as soon as I could obtain some muriatic acid, I began to test specimens

thus selected, and such as were the most sure to settle the disputed question, which it seemed I had now raised. In all these trials, of "post-oak" soils of various shades and qualities, and including some which (from their value and qualities) the intelligent proprietors were most confident of being highly calcareous, there was not one specimen examined by me, or brought to my notice that contained the least intermixture of carbonate of lime. And before I had provided the means for thus readily testing specimens, and exhibiting manifest evidence of the absence of all carbonate of lime, I had felt assured of that general proposition, by the character of the forest growth, the appearance of the soil, and still more by the fact that I heard, that there was no difficulty in making and burning bricks of the "post-oak" soil. Any notable quantity of carbonate of lime, in burning, would be made quick-lime, and slake afterwards when receiving moisture, and thereby, necessarily, would cause bricks to burst open or crumble.

The earliest French travellers and settlers on the Mississippi and its branches, when seeing lands bare of trees, and covered by tall grass, called them "prairies," (meadows.) This term has become universal in all the western states, (though usually disguised by a corrupted pronunciation, as "*pararah*,") for all new lands destitute of trees. Here, these former naked spaces bore but a very small proportion to the great extent of land upon which tall forest trees over-shadowed the dense under-growth of cane. The naked, or true prairies, in this region, were rarely more than a few acres in extent. But the peculiar and remarkable visible qualities of the soil agreed precisely with those of all the other neighboring or surrounding black land, (all being caused by the abundant though unequal quantities of lime in both kinds.) Therefore, though these forest-covered lands wanted the very mark of distinction implied in the name, yet to these also was extended the name of "prairie"—and the two varieties were distinguished as "bald prairie" and "wooded prairie." The trees covering these wooded prairies, were such as thrive best on calcareous and the richest neutral soils, as black-walnut, ash, shell-bark hickory, popaw, &c. Scarcely any of this always very fertile soil now remains uncleared, or bearing its original forest cover.

All the terms, used by the residents (as above stated, and also others,) to designate and distinguish these soils are unsatisfactory; and the distinctions (and agreements) of qualities, designed to be thus indicated, are founded on erroneous grounds. Also the terms are different, or the same terms are applied differently, in different localities. It would be better to arrange all the soils first into the two great divisions of *calcareous*, (or such as will effervesce on the application of diluted muriatic acid,) and the *non-calcareous*—and of which latter much also is *neutral* soil. All of the so-called "prairie" lands, of both kinds, so far as I have tested these soils, are calcareous—generally highly so—containing usually from 8 to 20 per cent. of carbonate of lime—and the "bald prairie" lands are excessively and injuriously supplied with carbonate of lime, having sometimes 50 per cent. or more, and the soil thereby is rendered much less productive, and, in extreme cases, nearly barren. The second great division embraces all the lands called "post-oak," of many shades and qualities, and the most distinctly marked reddish and yellowish surfaces. As said before, I have found none of these to effervesce with acid—and therefore they cannot contain any carbonate of lime—notwithstanding the general and heretofore undisputed opinion of the residents and planters to the contrary.*

Thus, after recently testing a number of different soils, and by carefully selected specimens of soils seen in their natural places—as well as formerly having more carefully analysed (for the calcareous contents only,) many hard specimens sent to me and described by other persons—I now venture to assert that all of the high-lying black soils,

* It is proper that I should admit that, though perhaps not positively and directly, yet indirectly, Mr. Tuomey's Reports seem much more to oppose than to sustain my opinion, of the general absence of carbonate of lime in the "post-oak" soils. He has not, indeed, distinctly affirmed the opposite opinion, as a general rule; but it would seem to be indirectly asserted, in such soils not being mentioned as being exceptional to the stated general rule of the highly calcareous constitution of the soils of this region in general. But there is also some direct evidence of this opposing opinion. First, Prof. Tuomey calls these soils "post-oak *prairies*." At page 140 of First Report, he said, "The stratum from which the soil of the post-oak prairies is derived, it is probable, was never continuous, but was deposited, as I have already

(or so-called "prairie" lands,) are highly and abundantly calcareous—and the "bald prairies" excessively calcareous—and that the true and unmixed "post-oak" lands, on the original reddish or yellowish soils are entirely destitute of carbonate of lime. And I infer of the latter general class of soils, that most of them, even though rich and neutral, would yet be benefitted by being manured with the close-adjacent and very accessible marl—and that all of the naturally poorer soils of this class are very deficient in lime, and therefore would certainly be improved by such application.

But, besides the well-marked qualities of these different soils, to be observed in the interior of the space occupied by each particular body, there are likewise, and of necessity must be, intermixtures of these different adjacent soils, where they meet, which partake of the composition and qualities of both. These intervening and intermixed portions of soil, and the different kinds of soil on each side, when under tillage together, must have their parts and qualities more and more intermixed, and the intermixtures extended by the effect of the plough in removing the adhering earth. Thus there is necessarily much of medium (or intermixed) soil lying between every two adjoining portions of different soils in the same field. Also, there are black and rich soils in the narrow depressions and bottoms, (the former "slues," [sloughs?] before the land was under culture,) of which the soil was formed by the deposition of washings from various soils brought from higher slopes. These soils usually are non-calcareous, though probably provided with lime in considerable, if not abundant quantity, in some other combinations than the carbonate. These several intermixed and medium soils may at first seem to oppose contradictions to the general divisions and descriptions offered above; but if duly considered, they will not be deemed exceptions to the general positions assumed.*

There are also extensive and very fertile bottoms, or flats bordering on creeks, (generally dry, but sometimes overflowing,) of which the soils have been furnished, or greatly increased, by washings brought by rain-floods from higher grounds. These soils contain none of the original lime-rock, (except as a deep under-lying bed,) nor even its smallest fragments or gravel—but only the fine and intermixed lime, diffused throughout in the minutest state of division, and combined with the different parent soils. Such soils, according to the character of their sources, may be either neutral, slightly calcareous, or highly calcareous—and in either case abundantly supplied with lime in some form. Many of the narrow bottoms (or former "slues,) are of neutral soil. The broad flat and fertile bottom on the Chehatchee Creek, Dallas county, (or the only specimen I selected and tested,) is of very slightly calcareous soil—and the rich bottom along the Cottonwood Creek, (Marengo,) is highly calcareous.

Of the portions of the high lands which I designate as non-calcareous, and which are usually known as "post-oak" lands, there are various qualities, in reference to value and production. Some of the best are more productive in cotton, (though not in corn,) than the best black lands—and some, even when new, are very inferior, for either crop, and some absolutely poor. The best and most fertile lands, of all the different varieties of appearance, are among the richest and most durable known any where. The first settlement and cultivation of this country are but forty years old; and most of the first cropping has been of much later date. But whatever was the time of the beginning, the tillage and exhaustion since have been continued and unremitting. And so well has the fertility been preserved under this continual exaction, and almost without manure, that it is still a commonly asserted and received doctrine that the best soils are inexhaustible, and will bear continual cropping for all future time. Long ago, and probably before any decrease of fertility had been observed anywhere, I protested against this belief as a dangerous delusion; and now, as formerly, I maintain that

said, in depressions on the surface of the limestone, after the latter had been subject to denudation. It [the post-oak soil] is composed of clay and *lime* intimately mixed, producing a subsoil of a light brown color, that is subject to crack by contraction when drying." I should not have deemed it necessary for me to refer to this opposition to my position, whether real or only apparent, but for the deservedly high scientific character of Prof. Tuomey, and my great deference to his general correctness of observation and deduction.

* Essay on Calcareous Manures, (5th Ed.)—Chap. vii., on Neutral Soils.

if this prevailing and almost universal course of unremitting and exhausting tillage is continued, a future time will come, however remote it may be, when this region will be reduced to a condition as barren and hopeless, as it has been, and is mostly still, of unsurpassed value for production. It seems difficult for a proprietor to yield the fond belief in the inexhaustible fertility of his land; and with many a sufficient ground for this reliance is the fact of the rich black soil being (in some places) three or four feet, or more, in depth, and that tillage has not yet touched more than the upper few inches. And though it is generally admitted that the average production of the older fields has much diminished, in consequence of the frequent occurrence of short crops, these failures are ascribed not to the general and remote cause of continued tillage, and generally under the same crop, but to such immediate transient causes as bad seasons, depredations of insects, and some of the many diseases of cotton. The latter causes of decreased production will be again considered in connection with the prevailing errors of continued and unchanged cropping.

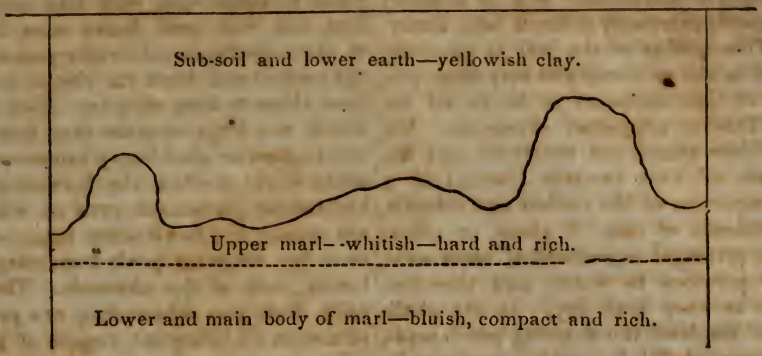
There are some other remarkable peculiarities of the lands of this region, which will now be mentioned. The consideration of the geological formation, or the ancient changes produced by such causes, will serve to explain the most important and strange of the present agricultural features of this region.

The great bed of lime-rock, which everywhere underlies the soils and upper earth of this region, is of the cretaceous formation, of the same geological age, and very like in characters, to the chalk of Europe. The fossil remains are of animals of that epoch.* In its great depth, and also the general chemical constitution, this bed is similar to the chalk. But this is more impure, (or contains less of carbonate of lime—) and it is not recognized as chalk by geologists, who deny that there is any chalk in America. This bed, in southern Alabama, is from 400 to more than 800 feet thick, as has been often ascertained in the different borings for the water confined beneath.* This great bed of marine deposition, which was the bottom of the then ocean in the cretaceous age, was subsequently upheaved, by volcanic or other forces acting under the earth, to its present elevation, and the northern side much the highest. At a later time, the great flood, coming from the north-west, which, elsewhere and on all the Atlantic slope, has left so many evidences of its violent and destructive passage and great effects—which deposited its heavier and earliest dropped burden of poor sand so generally over lower Virginia, North Carolina and South Carolina—here, in a later and more tranquil state of the overflowing waters, has deposited over the whole surface of the rock, the lighter and longer-borne sediment of fine and pure clay, which makes the much greater proportion of all the present soils and subsoils, and which upper beds are more or less altered by intermixture with the upturn foundation of soft calcareous rock, or the previously abraded and re-deposited, and again stirred-up portions thereof. But previous to this final deposition of the fine sediment of clay, the earlier and most violent currents of the great descending flood had operated to loosen, tear away, and partly to carry off, to greater or less distances, much of the higher and softer parts of the original thickness of the cretaceous bed, and to leave its reduced new surface with all the great irregularities of outline which now appears wherever the surface is exposed to view by excavation. Along the newly made cut for the railroad, near Union Town, through a poor "post-oak" ridge, (and where the sections of the strata could be best seen,) the profile was of the general character or appearance roughly represented on the next page:

* The only fossils I saw are *exogyna costata.* and *ostrea* ——?? which are common on the bald prairies and are both remarkably thick, massive and hard shells. In other places, there are many other shells of the cretaceous beds.

* Prof. Tuomey supposes the thickness to be full 1000 feet.

Perpendicular Section of Poor Post-Oak Land—In Forest.
Surface Soil—Clay.



The operation of the violent current of the flood was to wash away and remove completely from such places as this, all the much softer parts of the upper marl—leaving the harder parts, as seen in the now remaining protuberant eminences. Next followed, after the water had become nearly tranquil, its letting fall its last borne sediment of the purest and lightest clay, which deposite first filled the deeper hollows and next covered the highest parts of the marl, and next formed the upper bed and the surface, as they now exist. And in such places, there was so little intermixture of the then hard though irregular surface of the marl, (as it was washed clean, and left remaining, by the violent flood,) with the subsequently deposited clay, that even now there is no carbonate of lime in the clay within two inches above the soft lime-rock.

But elsewhere, and in all the now rich and deep black (or "prairie") lands, there was a different operation, and different manner of formation of soil. There, either the loosened and disintegrated lime-rock was partly left, as calcareous gravel, or this gravel was again deposited, after being swept from places where the current was too violent to leave any such loosened matter remaining in its original place. The intermixtures of this calcareous gravel with the fine clay subsequently deposited, would be sufficient to provide material for the deepest and richest of soils, with the subsequent aid of vegetable growth to provide organic matter. The remains of the calcareous gravel are still to be seen everywhere in exposed lower sections of the rich black soils, lying usually from one to three feet deep over the solid upper calcareous rock, and intermixed with black soil, which extends from that rock to the surface of the land. In the later time of the subsiding flood, when greatly lessened in volume and in force, and divided into different smaller currents flowing through the deeper channels afforded by the bottom, the water would continue to let fall its burden of fine clay sediment, in different quantities according to the depth, and the quicker or slower motion of the reduced waters. Wherever this pure clay sediment was deposited on the clean-washed and hard lime rock, and of sufficient depth, it served to make the existing patches of "post-oak" soil—which is either improved, or not, by subsequent admixtures of the lower lime-rock, and is, consequently, either rich or poor, according to the natural facilities for, or obstacles to, such intermixture of the lower lime with the upper soil. This very pure and close clay, after it had become dry soil, or lower earth, whether intermixed with lime or separate, would necessarily be almost impervious to the downward filtration of rain-water—and equally, or still more impervious is the thick calcareous bed below to the passage of descending rain-water, or to the ascent of the fountain water confined below the thick and impervious bed of lime-rock, and pressing upward for escape. With these physical conditions, of nearly impervious upper and lower beds, it is easy to trace and to understand the causes of the remarkable peculiarities of this country, in the entire absence of natural springs and of permanent streams—and of the waxy, adhesive quality of all the surface soils and subsoils and lower earth, when thoroughly wet by rain. This remarkable quality of the soil, which is the great evil of this

country, renders the roads almost impassable by wheel carriages, in winter; and every other mode of conveyance and of ordinary land travel, extremely difficult and annoying. This quality of the soil is generally ascribed to the universal and very large proportion of lime supposed to be in all the soils. This is altogether erroneous. Not only is lime absent (or nearly so, and the carbonate of lime entirely absent,) in a large proportion of the surface and subsoils, but carbonate of lime, if alone, or otherwise the principal ingredient of other soils, is very pervious to water, and therefore operates to keep land dry. In the chalk region of England, the watering ponds made (in the pure chalk) for cattle, require to be bottomed thickly with clay, and that well puddled, or the water will fast escape by downward filtration. It is very certain (of lands in Virginia) that soils containing ordinary proportions of silicious sand, if also slightly calcareous, are thereby enabled to to imbibe and retain more rain-water, and for a longer time, without its being excessive or hurtful—and also to discharge any injurious excess of rain-water, by evaporation or percolation, or both, more quickly than adjacent and sandy soils, not calcareous. The remarkable stickiness of these Alabama soils when wet, or their strong retentiveness of water in excess, as I infer, is owing to the absence or great deficiency of silicious sand, and the great quantity of unusually pure clay in these soils and their subsoils or under-beds. This clay absorbs and holds a very large quantity of rain-water in its outer and pulverized and pervious coat—(and therein is aided by the lime—) but, despite of the counteracting operation of the intermixed chalk, or carbonate of lime, its compact part is impervious to the deep penetration of the water, and its passage and escape by downward filtration. Thus, all the excess of water, which cannot flow off over the surface to lower levels, is held absorbed, and serves to make a mire of the upper soil, until it is carried off by evaporation. And the very large calcareous ingredient of the soil, which increases the absorbent power of the clay, also acts to aid and hasten the subsequent discharge by evaporation of the superfluous and hurtful water, as well as to retain, (even when the soil seems dryest,) much moisture that mere clay could not absorb. After the rain has ceased, and fair weather sets in, the too wet or miry soil dries rapidly, and, if tillage land, soon becomes friable and is easily pulverized. Compared to other soils with like uneven surface, and with such heavy rains, but little of the superfluous rain-water passes off over the surface and down the slopes, to the bottoms, there to form what are called creeks—which are large streams that flow only in wet seasons or after heavy rains—and sometimes even overflow the bordering flats—but are not permanent even in winter, and are usually dry in all other times, except as to a few stagnant pools remaining in the lowest parts of the channels. Thus, naturally, there was not a spring, or a permanent stream in all this great region of generally calcareous soil, and universal calcareous under-beds.

But these beds, whether the upper or lower, are not so entirely impervious as they would seem at first, and as is generally supposed. The soil cracks deeply in dry weather. And if there were deep under-drains, (as in the most improved modern system of thorough draining in England,) I have no doubt that these cracks and fissures of the earth would serve as aids to keep it drained—and free from the present evils of heavy rains—to nearly as great a depth as the bottoms of the drains, or say 4 to 5 feet. Also, the inferior bed of compact blue lime-rock is not always or entirely impervious to the passage, and escape of water, though it is to its downward filtration. This is proved by the following well-established and long known fact. Before such occurrences produced caution, it had often happened that the "seep wells," which were dug but a little into the compact lime-rock, and were supplied with water by the very slow lateral percolation, or "seeping" of rain-water from the earth above, were afterwards deepened; and it frequently followed, that by this deepening reaching some unsuspected fissures in the rock, the water escaped below, and the well became dry and useless. But this effect was not caused by the texture of the blue or solid marl being the least permeable to the filtrating action of water, but to minute passages formed by fissures, between layers of the rock. The upper portion of this bed is usually in layers parallel with the original horizontal plane of the bed, and of course now having the same very slight dip towards the south. These "joints" are scarcely perceptible in the covered and moist bed. But where exposed to the air, or

dried, the partings open, and probably cannot be closed again by being made wet. Along the perpendicular banks of the Alabama river, between Montgomery and Selma, where they expose the upper part of this bed, the layers of solid marl-rock are so regular in thickness, and exact in parallelism, and the joints between the horizontal layers so distinct, that the appearance is often more like a perpendicular wall of artificial and very perfectly laid masonry, than a natural formation. All of these regular joints are nearly horizontal. Very few, and these irregular, are fissures breaking through the layers of marl. And deep under the earth, where never dry, all these joints must be extremely close. Therefore, though some water may pass through them, it must be very slowly, and that in a lateral direction, following the slight dip of the layers.

With the few exceptions of the low and flat bottoms, subject to be more or less covered by rain-floods making swollen streams, the land of this region may be said to suffer from no water but the rain which falls immediately on it, and which rain, for much the greater part, always, and in most times entirely, is absorbed by the earth on which it falls. Therefore, according to the usually received opinions, here and elsewhere also, such lands need no draining—and there is none attempted, other than to open a ditch along a "slue" or narrow bottom, to allow the excess of rain-water, which flows off because the earth can hold no more, to escape to a neighbouring creek, or perhaps to flow over some other lower and more absorbent ground. But I have never seen any lands, not affected by springs or floods, that so much needed draining as these—or would so richly reward the labour of thorough and covered drainage. Both these propositions are founded upon the peculiarities of these soils, and underbeds in their texture, and relations to moisture—or to the readiness of the soil to absorb water, and the inability to let it pass through by filtration. No differently constituted soil and subsoil could retain so much water, or could discharge so little. Further—there is no soil, known to me, in which "thorough draining," as practised in England, could be executed so perfectly, or would be more durable. The firm, clay soil, or the firm marl when that was reached, would enable the very narrow ditches to be opened by the suitable utensils used in England. The conduit at bottom, of two or three inches width only, might be covered by the lumps of firm marl, dug elsewhere in the same ditch, or otherwise found close by. This rock, if again thus buried while moist, to construct and to cover the conduit, soon after being excavated, I suppose would be no more liable to be disintegrated than when in its original place. And so long as the rock remained firm, the passage beneath would keep open, and the drainage continue to be effectual. Such covered drains being made parallel to each other, and 60 feet apart, and 4½ to 5 feet deep, (according to the principles and plan advocated by Parkes,) would permit the soil to become dry generally to the depth of 3½ to 4 feet. Numerous minute cracks would form in such a clayey soil to the depth of the dried and shrunken earth. Such cracks, once formed in dry weather, will never again be perfectly closed, but will serve to pass superfluous water at all times to the lower neighbouring open conduits.

With covered drains thus operating, the land never would suffer with wetness. But this is not all. The future protection from drought would be as great as from wetness. No lands suffer so much from drought, when dry, as those which most suffer for want of draining at other seasons. A clay soil or sub-soil soaked in water through winter, and drying in summer, becomes almost as hard as brick, and is then almost incapable of absorbing moisture from the atmosphere, or of supporting plants. The same soil, if thoroughly drained, and so kept free from superfluous water through winter, will be subsequently fissured and pulverized throughout, and kept in the best condition for attracting and retaining a proper degree of moisture, as well as for passing off great and hurtful quantities. A soil thus drained, and more especially if constituted like these cane-brake soils, could absorb and retain more water without damage—would more strongly retain small supplies, would absorb more moisture from the air, in droughts, than any soil of different constitution and character, even if as well drained. And, generally, it may be truly said that such thorough and covered draining would enable these lands and their crops to profit fully by every remarkable good quality of the soil—as depth and richness of soil, abundance of lime, absorbent

texture, and constitution of soil and subsoil; and greatly to lessen or entirely remove, all ill effects of other peculiar bad qualities--- as excess of clay and impermeable texture, miry fields and roads, and a deficiency of sand.

But even if all these positions were admitted, the great cost of such thorough draining will prevent its being attempted, or a thought of its execution being entertained by any planter. It is true that it might cost as much as the present average price of good land in Marengo, or $50 the acre. But that would be only equal to an annual expenditure of the interest of $50, which, at 8 per cent., would be $4 a year. What planter is there who does not lose much more than $4 annually on each acre, by the disadvantages which thorough drainage would remove? And if removed, besides the gain in saving labour, who might not expect to make twice as much of additional crop to the acre, as would sell for $4?

Besides the remarkable qualities of most of these soils, in the unusual and great abundance of carbonate of lime, and of fine clay, and of the great deficiency of silicious sand—compared to all other soils, previously or elsewhere known to me—it seems that there is another rare character of constitution, in the sometimes, if not general, uncommon abundance of organic matter in these soils, sub-soils, and under-beds. I regret much, that on this interesting point I have but little of precise information. In making my own early examinations and partial analyses of specimens of these soils, selected for me by residents, my attention was directed almost exclusively to the then novel and interesting subject of ascertaining the absence or presence, and the proportion when present, of carbonate of lime. I was not competent, and did not attempt to conduct a full analysis of soil—and did not then extend my search even to results I might have obtained, if then known to be of great interest. Thus, I did not suspect any remarkable quantities of organic matter, until I saw such reported of sundry specimens analized by Drs. Cooper, Gibbes, and Nott, (of S. C.,) and which I republished in the Farmer's Register, (vol. ii., p. 716, and iii, p. 272; and also vol. iii, p. 332--3, in condensed form.) And while yielding all deference to the general knowledge of these gentlemen in chemical science, I cannot help suspecting that, in conducting these analyses, they may have erred, as Davy, and all of the greatest as well as all inferior chemists had formerly done, in the method for ascertaining the true proportions of carbonate of lime. I infer this, because, while professing to report *all* the contents of the various soils, there is stated in the results no other salt of lime except the carbonate—when there is strong indirect evidence (as I will show) of the presence of some other salts of lime. But even if this error existed, it has no bearing on the particular to which I shall refer, and in which I presume these analyses may be relied upon. This is the general and remarkable large proportion of organic matter. Of 12 specimens of soils or sub-soils, (which will be stated with others hereafter,) and none including any of the surface or of the recent and undecomposed vegetable matter, all containing proportions of vegetable matter, in no case less than 20 per cent., and in one case only, less than 25 per cent., and from that to as much as 38 per cent.! All this vegetable matter must have been not only fully decomposed, but, (according to my views,) chemically combined with the lime, and by that means fixed in the soil. But for the very large amount of lime, it would have been impossible for any soil to have retained, and almost concealed, the presence of one-half or one-third of such large proportions of vegetable or organic matter. These 12 samples were all, except two, (which were not stated,) taken at not less than 6 or 8 inches below the surface. And one of them, at 18 inches below the surface, contained more vegetable matter (and also more carbonate of lime,) than the soil 12 inches immediately above. But before making farther comments, or deductions, I will offer in a condensed form, a statement of all the analyses made heretofore by myself or by others, and formerly published by me, of soils of the calcareous region of Alabama. Some others from other states only, and remote localities, will be omitted here. I will arrange them in separate classes—but each one before reported will be referred to by its former number, and the page and volume where it was more fully described in the Farmer's Register.

I. MARL, OR "ROTTEN LIME-STONE," OF BOTH UPPER AND LOWER BEDS.

Several specimens from Marengo county (sent by Richard Cocke) varied in the pro

portions of carbonate of lime, per cent. from 72 to 82.

Upper and softer yellowish white marl, but compact for that kind, from new cut of rail-road near Union Town---78 per cent. Residue, entirely a yellowish pure clay.

Lower and bluish compact marl, Marengo, A. P. Calhoun's, 82. Residue, a black pure clay, containing (apparently) much organic matter. No silicious sand in either of the two last specimens. Both of these selected recently by myself.

II. Soils (and Sub-soils) of "Bald Prairie."

(No. 2, described page 331, vol. iii, Farmer's Register,) soil---Marengo—R. Cocke---Carbonate of lime 59 per cent.

(No. 9, p. 332,) Soil---near Demopolis, Dr. R. Withers—(produced corn well, but not cotton,) 60.

(No. 10. p. 332,) Sub-soil, at one foot deep---Greene county---R. Withers—50. per cent. The lime rock there at 2 feet below surface.

(No. 20, p. 332,) Lowndes---Col. J. Deas, ---at 1½ feet below the surface of a thin poor soil nearly white---84 per cent.

(No. 21, p. 332,) Same field, also rather poor---darker---3 feet deep, 27 per cent.

(†No. 35, p. 333,) Lowndes---Chisholm's, white bald prairie—from near surface. Soil (above the rock) only 18 inches deep. Carbonate of lime 42, and *vegetable matter* 28 *per cent.!*

Soil (4 inches from surface) of bald prairie---Dallas county---R. H. Adams'. Poor, capable of bringing 12 to 15 bushels of corn. 604 grains, separated by a corn-meal wire seive, into 170 of coarser (mostly calcareous gravel,) and 434 of finer. The coarser contained 62 per cent., and the finer 51 of carbonate of lime---or about 54 of general average. The residue was about half of very fine sand, and the other half of fine black clay.

III. Calcareous Soils—either formerly open prairie, (not poor prairie,) or otherwise covered by forest—and all rich.

No. 1, p. 331, vol. iii.) Prairie soil of most productive kind—Marengo—R. Cocke. Black clay, with scarcely any sand. Contained 8 per cent. of carbonite of lime.

† This analyzed by Dr. R. W. Gibbes.

(No. 3, p. 331.) Marengo—R. Cocke. Very rich cane-brake land—naturally wetter, 16 per cent.

(No. 19, p. 332.) Lowndes—J. Deas. Open prairie—very fertile—black. Taken 4½ feet deep, but still dark stiff clay, apparently very rich, 11 per cent.

(*No. 23, p. 332, and vol. ii. p. 716. Lowndes—J. Deas. Open prairie, contained carbonate of lime 25, and *vegetable matter* 28 per cent.

(*No. 24, p. 333, vol. iii. and p. 716, vol. ii.) Same plantation, "slue prairie," or "wooded prairie"—15 per cent. of carbonate of lime, and 25 of *vegetable matter.*

(* No. 25, p. 333, vol. iii. and p. 716, vol. ii.) Montgomery county, Elmore and Taylor. Open prairie, taken at 6 inches deep—carbonate of line 38, and *vegetable matter* 20 per cent.

(*No. 26, p. 333, vol. iii. and p. 716, vol. ii.) Taken from below the preceding at 18 inches below the surface—carbonate of lime 48, and *vegetable matter* 29 per cent—showing the remarkable fact of the latter increasing greatly as descending.

(†No. 27, p. 333, vol. iii. and also p. 272, vol. iii.) Black slue prairie, Montgomery, F. Elmore. (Wooded Prairie?) 6 to 8 inches below surface. Carbonate lime 32. *Vegetable matter* 26.

(†No. 28, p. 333 and 272.) Same—Hammock prairie—6 to 8 inches depth. Carbonate lime 22, *Vegetable matter* 36 per cent.

(†No. 30, p. 333 and 272.) Hog-bed prairie, Lowndes—6 to 8 inches. Colbert's. Carbonate lime 8, and *Vegetable matter,* 26 per cent.

†No. 32, p. 333 and 273.) Lowndes—J. H. Taylor. Black slue prairie—wood land—best—6 to 8 inches deep. Carbonate lime 12, *Vegetable matter,* 28 per cent.

(†No. 33, p. 333 and 273.) Lowndes—do. Prairie with scattering large post oaks. Soil (taken at 6 to 8 inches) mingled with red clay. Carbonate lime, 6, *Vegetable matter,* 32 per cent.

(†No. 34, p. 333 and 273.) Lowndes—do. Open prairie—from a ridge—6 to 8 inches depth. Carbonate lime 18, *Vegetable matter,* 32 per cent.

* These specimens analysed by Drs. Cooper Gibbes and Nott.

† These analysed by Dr R. W. Gibbes.

No. 1, p. 498, vol. iii.) Greene—Dr. R. Withers. Loose, dark friable sandy loam. No evidence to the eye of being calcareous. Contained carbonate lime, 8 per cent.

(No. 2, p. 498.) Greene—R. Withers. Open or bald prairie of the most usual kind, would then produce 50 bushels of corn—but produces cotton badly. Contained 33 per cent. carbonate lime.

To these, as examples, may be added almost every black and rich high land soil in all this region, as was made evident to me by numerous recent testings by acid, or otherwise by the presence of calcareous gravel, obvious to the sight, and therefore, requiring no chemical test of the soil.

IV. POST OAK OR OTHER NON-CALCAREOUS LANDS—FOUND BY ANALYSIS TO CONTAIN NO CARBONATE OF LIME.

No. 3, p. 498, vol. iii.) Greene—R. Withers. Post oak land. Very tenacious clay soil. Retains water strongly. Very miry after rainy weather, and very hard in dry.

(No. 4, p. 331.) Marengo—R. Cocke. Rich bottom cane land—very wet in winter, though dry in summer.

(No. 5, p. 331.) Marengo—R. Cocke. Best post oak land—trees of that kind from 2 to 4 feet in diameter—little underwood and no cane. Nearly as rich as best cane land.

(No. 6, p. 331.) Palmetto land—Large trees—small cane. Soil 4 to 10 feet deep. Wet and cold before being cultivated, but afterwards dry and in good tilth.

(†No. 31, p. 333 and 272.) Post oak land. Montgomery—F. Elmore. *Vegetable matter*, 38 per cent., and no carbonate of lime.

(†No. 29, p. 333 and 272.) Montgomery—F. Elmore. Open prairie—mahogany colored. *Vegetable matter*, 38 per cent. No limestone [or carbonate of lime.]

To these may be added very many other "post oak" soils, rich, of medium fertility and poor, which I lately examined and tested, in place, and which, like all the above contained not a particle of carbonate of lime.

In endeavoring to arrange the foregoing soils into classes, it is possible that mistakes may have been made, especially as to some of these copied from the reports of others. For the terms used are not only often inaccurate in the general signification, but they are also applied differently in different localities, and consequently by different writers. Thus "bald" and "open" prairie, are used by different persons to designate the richest, as well as the poorest land. Other confine "bald" to the extremely calcareous and also poor praries. "Slue" is used by some for low and formerly wet bottoms only, and by others, "slue prairie" is evidently used as synonymous with "wooded prairie."

In addition to the "open" or "bald prairie" which at first might have been rich, in after time, in many cases, by continued exhausting tillage, and by washing, has become very poor. Thus, there may be doubt as to whether some samples should have been placed in the second or the third of the above divisions.

If the very large proportions of vegetable (or organic) matter, stated in every one of twelve analyses made by Drs. Cooper, Gibbes and Nott, are usual in all these calcareous lands, it is a very curious and important fact, which well deserves the attention of the proprietors in reference to the future fertility and production of their lands, and also of chemits and scientific agriculturists, as being a novel and very interesting fact in agricultural chemistry. Both as a question of agricultural science, and of agricultural economy and improvement, the proper and thorough investigation of these soils by a competent and faithful chemist, would be rewarded by most interesting and important results.

According to my own partial analyses, and rough testing of numerous specimens of soils and of general examinations of the lands, there can be no question of the remarkable and general abundance of carbonate of lime in the calcareous soils—and of its total absence in the "post oak lands—of the great deficiency of fine silicious sand, and the entire general absence of coarse, in both kinds—and the unusual and very large proportion of fine clay. And, if the twelve analyses of different soils and subsoils in Lowndes, by Drs. Cooper, Gibbes, and Nott are to be taken as indications of the general constitution of the black and calcareous soils, there is also as remarkable and unusual an excess of vegetable matter—and more than has been found in any other soils yet known, except in peaty soils.

To be Continued.

† No. 29 is here put down as reported by Dr. R. W. Gibbes. But from the different result (in absence of carbonate of lime) from all other "open prairie" soil, I suspect a mistakn in labelling the specimen—and the more so, because it agrees precisely in its parts with the preceding, No. 31.

For the Southern Planter.

Meteorological Inquiries Answered.

OBSERVATORY, Washington,
29th June, 1860.

GENTLEMEN :

Though your letters differ in their dates, and are written from places widely apart, they relate to the same subject, and reach me about the same time. The answer to one is answer to the other, and therefore I make but one reply.

You tell me that the seasons appear to be sadly out of joint in Texas; that everything with you is burnt up for the want of rain; and that it is reported there I have predicted that Western Texas will ultimately, and that, too, at no distant day, become a desert.

You ask me for the grounds of this belief, and if I ever said so.

In the first place, I never said any such thing; and in the next place, no sane man can say he has any ground whatever for any such belief. Nor can I imagine how such arrant nonsense as predictions about the weather we are to have the next month, or year, or generation, came to be placed in my mouth.

I tell you what I have said, though, and what I say now: I say that if the agriculturists would give me their countenance, and Government its leave, in extending my meteorological investigations to the land, I could render a service to the cause of science, from which farming, and planting, and grazing would receive benefits as signal as those which commerce and navigation have derived from our meteorological labours at sea.

You know that some six or eight years ago, the principal maritime nations of Europe were invited to co-operate with us in a system of meteorological observations at sea; and that in a conference held at Brussels for the purpose, a plan of observations was agreed upon, and that ships now, both men-of-war and merchant-men, are engaged under all flags in carrying out this system. It is upon the plan of voluntary co-operation. From it, discoveries most important to science and valuable to navigation have been made. I have asked to have the plan extended to the shore, maintaining that if it were, I could secure there the volunteer co-operation in every county in every State, of at least one farmer, to observe and report upon the weather; that with such an organization, as much may be done for agriculture and the industrial pursuits of the land, as has been accomplished for those of the sea.

By connecting with this plan a system of daily telegraphic reports of wind and weather, I believe warning more or less ample might be given of every storm that comes where the telegraph goes. I have stated this officially, and urged it publicly. But jealousies and other miserable influences of one sort or another have hitherto stood in the way of its adoption.

I think the magnetic telegraph is capapable of being made the most powerful meteorological implement of the age. In proper lands, it can be made to give warning of every coming change in the weather; and it is a reproach to us as a nation, who have a greater extent of telegraph than all the world beside, that it should not be turned to account in this respect.

When I first appealed to ship-masters and owners for their co-operation, in these researches at sea, they turned as deaf an ear as the farmers and planters have done about extending these researches to the land. But I got leave to go ahead, and make the trial with such materials as I could lay hands on, or find by ransacking garrets and overhauling old sea-journals.

A chart embodying the results was published; a ship-master was persuaded to take it to sea with him, to go by it, and give it a trial. He did so; and to the astonishment of everybody he went to Rio, discharged cargo, took in another, and returned home in little more than the time it usually took to go.

After that, there was no lack of co-operation; and in a little while, without money or patronage, and with nothing to give for the service but a chart, I had a fleet of more than a thousand sail engaged night and day, and on all parts of the ocean, in making and recording the requisite observations.

Do you ask, why do I not do the same thing for the agriculturists? Simply because I can't get the leave. The law allows me to discuss the observations that are made on board ship at sea, but I am

not permitted to touch one that is made on a farm ashore.

If you and others desire information from me about the climatology of Texas, I have to say, I should be most happy to give it. But before I can attempt it, you must assist me to procure the requisite data; and that is to be done by using your influence with your Representatives in Congress in favour of the passage of an Act, to enable me to extend my meteorological investigations to the land, and to use the magnetic telegraph as a meteorological implement.

Do that—and let those who are interested in the soil in other States, do the same by their Representatives, and you shall soon have results that will prove valuable not only to the industrial pursuits of the country, but to the convenience, and health, and advancement in knowledge, of the people also.

In urging the extension of this beautiful and beneficial system of generous co-operation to the land, it may not be amiss to state a few facts connected with the history of it at sea. At first, I invoked co-operation from American ship-masters alone. After the utility of the plan had been demonstrated by the results derived from the observations afforded by them, then the importance of increasing the number of observers became manifest. All who go down to the sea in ships were invited to take part in the plan. They did so; and thus was established the most extensive, useful and important system of meteorological research that has ever been attempted. Its praises are sung the world over. The wisest philosophers, the greatest statesmen, and the most powerful nations have bestowed upon it the commendation of their "Well done," and rendered homage to it.

The atmosphere covers the land as well as the sea, and why should not this system, which costs nothing except the hire of a few computers to discuss the observation, after they are made,—why, I say, should not this inexpensive system of meteorological investigation be extended to the land, and so be made universal? Two-thirds of the surface of our planet is covered by sea, and our researches embrace the sea—why should they not include the other third also?

We took the lead in inaugurating this plan at sea, and the meteorologists of Europe look to us to take the lead for the land also. The most eminent among them there, say they are waiting for us. Each nation will take care of its own observations; but the point is so to make them, that any observation by any one may be compared with all the corresponding observations by all the others, and thus make the "whole world kin."

Ten times as much money as this plan would cost is now annually spent in one way or another for the advancement of meteorology; but, from this expenditure the cause of the science is not advanced one-tenth part as much as by the adoption of the plan proposed, it would be.

But it is not the husbandman alone that is practically—may I be permitted to say, *pecuniarily?*—interested in this scheme. In pleading the cause of science, I often find an appeal to the pocket-nerve very telling.

The question has been asked, and answered before the Society of Acclimation in France: "At present, what is meteorology to the science of political economy? Answer: Nothing. What should it be? Answer: Everything."*

The object of this interesting Society is, to encourage the introduction from one country to another of new plants and animals; and when it is proposed to introduce either into France, for instance, the first question is, what is the climate of its habitat, and in what part of France shall we find a climate to correspond? So the whole affair is one of meteorology.

Impressed with the notion that the Alpaca and Vicuña of South America would, were they acclimated to any of the mountainous regions of this country, prove almost, if not altogether, as valuable as the sheep and the goat, I proposed last fall their introduction, to the Agricultural Society of Tennessee.

So valuable are they considered in their native hills, that it is against the laws both of Peru and Bolivia, where they most abound, to export them.

However, having been heartily and ably seconded in other matters of public concern by our most worthy minister, John Randolph Clay, at the court of Lima, I sought and most readily obtained his great

* M. Becquerel.

influence with the governments there. He was glad, true representative of a great nation as he is, to assist in such a good work, and has already obtained from the government of Bolivia a permit for me to export fifty of each kind. These are at the service, in whole or in part, of any gentlemen, not speculators, who will send for them and bring them into the country. I think they may do well in the mountains of Tennessee, Virginia, and other States, bordering both on the Atlantic and the Pacific. But that is opinion. Had I been permitted to extend our meteorological systo the land, my opinion upon the subject, whatever it be, would then have been based on certain and positive knowledge.

A couple of gentlemen from Tennessee propose to send for at least a portion of these noble herds, with the view of trying the experiment in that State.

Pray excuse me for writing so long a reply. You have asked questions that I cannot answer. If you would have answers, not only you, but our friends in every State must assist in enabling me to procure the data by extending my researches landward.

Respectfully, &c.,

M. F. MAURY.

To Messrs. Monroe Hardeman, et al.
Prairie Lea, Caldwell Co., Texas.
And to Messrs. A. P. Swisher and
John Spence, *Bastrop, Texas.*

Nature the best Economist.

The Paris journals announce that the Government has decreed that the sea-weed washed upon the coast of Normandy and Brittany shall be gathered as wadding for artillery. It keeps the guns cool and is not liable to ignition. Cotton and wool have hitherto been used. Here we have another instance given to the world of tho value of things too often deemed worthless. In the great laboratory of nature there is nothing that exists that will not perform uses, could the ministry of man, with cunning arts familiar, adapt it to the offices for which it is fitted. Science in our day is only on the threshold of the great arena of nature, which yet will reveal, through common and discarded things, means of adding a thousand benefits to mankind. Nothing is so worthless to a people that it ought to be thrown away.

Fertilizers.

BY HON. THOMAS G. CLEMSON, LL. D.

[*Abridged from Patent Office Report of* 1859, *and divided into three parts.*—Ed. So. Planter.

PART I.

From the day when the *fiat* went forth, "In the sweat of thy face shalt thou eat bread," agriculture took its place among the arts of the world. It is true, while population was sparse, and man depended first on game and then on flocks and herds, this art made little or no progress. The tropical climate, where the infancy of man seems to have been cradled, would appear also to have led him to defer the necessity of much attention to it. Very soon, however, the increasing density of population must have necessitated its development, since we find that the Egyptians, at the earliest period to which history reaches, were *already* skilful agriculturists, and had carried the art to such a point of perfection as not only to have sustained their own dense population, but to have made Egypt the granary of the world. That it was not entirely the fertility of that favored region to which this was due, we have evidence in the present state of that country. The Nile still overflows the land with fatness, and the sun still sheds its vivifying influence; yet, there, agriculture has sunk to its lowest ebb, and the country scarce supports its miserable tribes; its immense world-renowned monuments alone remain to show what the land once was. Egypt is the most striking proof which history presents of the inseparable connection between the high state of civilization and a high development of agricultural resources. They rise and fall together, and the prosperity and, indeed, existence of the one is identical with the other. Let that nation beware, whose exhausted fields are forcing her population to emigrate. Civilization, in its highest degree, cannot exist without dense population; nor dense population, without calling to its aid the highest resources of agriculture.

Egypt stands a living, or rather, a dead type of the intimate connection between population and agriculture. China is one equally striking, on the opposite side. For how many thousand years has her painstaking care for every foot of her soil maintained her prosperous and dense legions, in a region comparatively but little favored by

Nature, and given a respectable position among nations to a people but little intellectually gifted! How many wonderful discoveries do we owe to the necessities of their compact masses! The struggle for existence has always been one of the greatest stimulants to the activity of the human mind.

This continuous prosperity, through a long series of centuries, is owing to the sedulous care of the government. No people, left to themselves, will think of future generations; and it is for that reason that all governments should foster and aid the development of this most important of arts, as government only can.* This is so well understood in the present day, by all nations, that those who govern are turning their attention daily more and more to its aid and advancement. England has done so by direct legislation; her aristocracy, also an integral part of her government, having, consequently, the weight necessary to carry out a continuous system, has given all the impetus of this weight and their great wealth to its energetic development.

It is only within comparatively few years that science has revealed to us the true composition of bodies and the laws that govern their action; thus developing the wonderful resources of Nature, and reducing that to system which, in the time of our forefathers, was ignorant practice based upon hereditary experience.

It is true that this subject has occupied, from the earliest times, the attention of statesmen, philosophers and philanthropists; but they only collected and reasoned from the results of experience, without entering into the laws which led to and governed the results which they recorded. Agriculture, therefore, now stands upon a basis far different from what it has hitherto occupied; and not working, as we have heretofore, in the dark, but knowing *where to look* for causes and effects, we may expect in the next century to make a stride that will give to this art, or rather convocation of arts, a place among the exact sciences. But this very rapidity of advancement will render it more fatal to be left behind in the race; and neither nations nor individuals can stand supinely by, depending upon the past, and exhausting the accumulated resources of Nature, without individual and national ruin.

* * * * * *

One of the most interesting and important subjects to the agriculturist is, of course, the means of keeping up, or restoring the fertility of his land; and that he may not work in the dark, it is essential that he should understand the nature and action of soils, the functions of plants, and the operation of fertilizers.

It is important we should always bear in mind that this earth is not a heterogeneous mixture of an indefinite number of illy-defined substances, but, on the contrary, the different objects or forms of matter which present themselves to our senses are limited in the number of their constituents; as far as knowledge extends they do not exceed sixty-two.

Each substance is *sui generis*, and, no matter from whence taken, possesses precisely similar properties, and is governed by invariable laws in its action upon other substances. They are solid, liquid, or aeriform, according to circumstances. Water is a familiar example; it is solid in the form of ice, liquid in water, and aeriform in steam.

Substances have been created once and forever; they may change place, form, and combinations, but such a thing as blotting out of existence, or re-creation, is impossible. Some are abundant, while others are exceedingly rare, and difficult to procure. To show the small or limited number of substances which enter into the bodies around us, it is only necessary to remember that the great mineral masses, which form by far the largest portion of the earth, are composed, as far as our knowledge extends, of a few elementary principles. Water is composed of two gases, and the air we breathe likewise of two gases, one of which is common alike to air and water. Nor do they combine in an indefinite manner; they unite with each other in simple, definite propor-

* Under the complex system which prevails in this country, there can be no doubt that the power is inherent in, and of binding obligation upon the *State governments*, to "foster and aid the development of this most important of arts," but, whether the *Federal Government* has any *direct* power over the subject, or can any otherwise "foster and aid" agriculture, than through the *incidental effects* of the lawful exercise of its specified, constitutional powers, admits of very grave doubt; and in view of the uncertainty in the premises, therefore, it had better be let alone before it is meddled with, lest haply, by the exercise of the questionable prerogative, it may be found fighting against the rights of the States.

W.

portions, multiples the one of the other, and the quantity rarely surpasses the proportion of five to one. Substances may be, it is true, heterogeneously *mixed* in any proportions, and these mixtures present endless varieties, but are not chemical compounds, and do not enter into the category of which we are speaking.

Matter may be divided into that which has life, and that which is without life. The principal part of the substances which go to compose organic beings exists around us, in the air we breathe, (water, carbonic acid, nitrogen). There are other substances not less essential to organic life, but which are found to enter their composition in infinitely smaller quantities. These are found in the ashes, after incineration of any vegetable or animal matter. We shall learn their composition as we proceed.

Those things which are endowed with vitality are produced, then increase, and mature. Inorganic substances increase by the juxtaposition of similar parts, and their form is destroyed by forces exterior to themselves, while organisms reproduce their like, and have a period of existence determined by laws, which fix their time of growth, decay, and death. Of organic life there are two distinct classes, one receiving its food through a digestive canal, and is endowed with locomotion; the other is fixed by roots to the soil. This is not rigorously correct, but sufficiently so for our present purpose. The last, or vegetable productions, receive a portion of their food through their roots, and another through their leaves. The root answers a double purpose, that of fixing the plant in the earth, and drawing from it nourishment. Vegetable anatomy informs us that among the elements of their construction there are cells, which are found in all plants, whatever character they may have, and those cells, by transformations and successive development, form fibres, tubes, or elongated canals. While the characteristics of the animal and vegetable classes are thus marked, the qualitative chemical composition of both is identical; the principal organic portions of which—I do not allude to the mineral constituents, or ash, and there is great similarity in that respect —may be said to express the condensation of the gases of which they are composed. Oxygen, hydrogen, carbon and nitrogen, form the volatile portions; and silex, lime, potash, soda, magnesia, iron, sulphur and phosphorus, the mineral parts. It is mainly with those substances that we have to deal in connection with fertility or agriculture. If we can turn a never-ceasing influx of them into our fields, the problem of fertility is solved, and it remains for us to consider their properties, their history, their action the one upon the other, and the means that have heretofore been employed of making them subservient to our wants.

Plants are divided into two distinct classes, those that receive their increment from within and those that receive their growth on the exterior. The first are called endogens, the latter exogens. All organized bodies have forms and properties peculiar and inherent to themselves, and those forms and properties characterize the parts as well as the whole; and it is that particular form and the properties of the parts that render it what it is and make it a living thing. Some plants go through the different stages of germination, growth, fructification, and death in one season; they are called annuals. Others live through a succession of years, and are called perennial.

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It is through the roots that the ash or mineral ingredient enters [a plant,] while the leaves absorb from the atmosphere the organic or combustible portion. The power of assimilation appears to be dependent upon the action of light. A plant placed in water, containing carbonic acid, and exposed to the light of the sun, absorbs the acid and gives off oxygen. At night the action is reversed, and carbonic acid is emitted, when oxygen is assimilated. Every one has remarked the tendency of plants to lean towards the sun, and where they are kept in cellars they will bend even several feet from the perpendicular to receeive the rays of light that may enter through an aperture. In the early stages of plant-life, the carbon of the soil enters through the roots; but when the plant has risen above the ground, and its leaves are formed, the carbon of the soil is no longer needed, and it is probable that what is required is entirely assimilated from the carbonic acid of the atmosphere.

The sap rises from the roots through the internal vessels to the leaves, becomes carbonized by the decomposition of the carbonic acid of the atmosphere, and passes down into the plant, forming ligneous fiber, &c. We shall not enter into the subject of vegetable physiology; that would be foreign

to our purpose. Fertility depends at once upon the chemical composition and mechanical condition of the soil; nor can it be independent of subsoil and climatic influences. The latter question, including the chemistry of ozone, is one of great intricacy. It is so interwoven with heat, electricity, moisture, and chemical reaction as almost to baffle investigation. Plants generate and evolve heat, and possess the power of preventing their juices from freezing at a degree of temperature far below that at which congelation would take place were the plant dead. Fertility is a relative term, and is dependent upon multifarious influences. A certain degree of heat and moisture is essential to life; without them, there can be no germination nor maturation of seed; nor are these essentials independent of soil, or rather its constituents, we may say one constituent, for the absence or presence of one substance may secure fertility or produce sterility.

With these preliminary remarks, we pass to the consideration of water in its connection with fertility:

Water in a perfectly pure state is composed of two volumes of hydrogen gas and one of oxygen, and about 89 parts of oxygen and 11 of hydrogen by weight. When you mix the two gases they will remain uncombined for an indefinite period, unless the mixture should be submitted to the action of heat or electricity. The combination then takes place with the manifestation of stupendous force. The two components may be separated by electricity. Water enters into the composition of all vegetable and animal structures. It is one of the principal constituents of blood, milk, and sap. By its assistance, silex and other insoluble substances enter into circulation, and are assimilated by animals and vegetables. It is found to make part of all grains, woods, leaves, &c. Its absence would produce universal death. It enters into all our domestic operations, and forms part of all alcoholic beverages and articles of food. It is essential to production, and it may be said that fertility in any locality is in direct proportion to humidity, and sterility in proportion to its absence. The truth of this proposition is verified in a remarkable degree in the deserts of Sahara and the western plains of this continent.

Water is never obtained pure from natural sources; it is procured by distillation. That which issues from springs, generally contains mineral substances, and always impurities of a gaseous nature. There are waters, even river waters, that at times evaporate without residuum. Such is the case of the Schuylkill, at Philadelphia. We have used it for months together, in analysis. Rain-water, and that which falls in the form of dew, are also impure. The former, though much freer from impurities than that which has flowed over the ground, comes down charged with all the impurities of the atmosphere, which it washes as it descends. These substances are varied and numerous, consisting of impalpable sand, vegetable and animal particles, also salt taken up from the ocean. That which first falls after a drought is often charged with the offensive odor of animal perspiration, excrements, and putrefaction. It also brings down fishes and frogs, and at times organisms and pollen, to the extent of tinging the surface of the earth with the color of the adventitious matter. Rain-water always contains ammonia and nitric acid. These are partly formed by the action of electricity in the atmosphere, and are partly the result of decompositions which take place on the surface of the earth and in the air.

Pure water is insipid and unhealthy. That taken from springs or rivers, independent of any mineral ingredients which it may hold in solution, always contains a quantity of oxygen gas, the great supporter of life and combustion. This imparts a tonic-invigorating quality to cold water, which, when boiled, it does not possess; to the latter, emetic qualities are attributed. Water, from its known quality of containing oxygen in weak combination, or in an evanescent form, together with carbonic acid, is a powerful and essential agent in chemical action, which is ever occurring in the soil, &c. The substances held in solution vary in different rivers and different parts of the same stream, both in kind and in proportions of the saline ingredients.

* * * * * *

Much has been written upon the sewerage of cities throughout the world. This is a subject of great importance, not only to the agricultural wealth of the country, but imminent to its sanitary condition. The value that is daily washed into rivulets from our lands, and thence to the sea, is incalculable. Mr. Grey, in speaking of the Medloch, says: "it receives the drainage of not more than 100,000, and contains sufficient phosphoric

acid to supply 95,000 acres of wheat, 184,000 acres of potatoes, or 280,000 acres of oats, and to hold in solution a sufficient quantity of silica to supply 50,000 acres of wheat."

A distinguished agricultural writer in 1845 makes the following remarks upon the subject of the sewerage of London:

"By carefully conducted experiments and very accurate gaugings, it has been found that the chief London sewers convey daily into the Thames about 115,000 tons of mixed drainage, consisting, on an average computation, of one part of solid and twenty-five absolutely fluid matters; but if we only allow one part in thirty of this immense mass to be composed of solid substances, then we have the large quantity of more than 3,800 [tons] of solid manure daily poured into the river from London alone, consisting principally of excrements, soot, and the debris of the London streets, which is chiefly carbonate of lime; thus, allowing twenty tons of the manure as a dressing for an acre of ground, there is evidently a quantity of solid manure annually poured into the river equal to fertilizing more than 50,000 acres of the poorest cultivated land! The quantity of food thus lost to the country by this heedless waste of manure is enormous; for only allowing one crop of wheat to be raised on these 50,000 acres that would be equal to the maintenance (calculating upon an average produce of three quarters of wheat per acre) of 150,000 persons. London, too, is only one huge instance of this thoughtless waste of the agricultural riches of the soil of England. From every other English city, every town, every hamlet, is hourly passing into the sea a proportionate waste of liquid manure; and I have only spoken of the solid or mechanically suspended matters of the average; the absolutely fluid portion is still rich in urine, ammoniacal salts, soda," &c.

The earth is surrounded by water in a state of vapor, and the quantity varies according to the temperature of the atmosphere and other circumstances. Verner found as a mean of fifty experiments, in 1,000 parts of air, 8.47 parts of vapor. In the forenoon, and before two o'clock, the mean was 7.97; and between two p. m. and evening, 8.85. There is more humidity in the atmosphere during the day than at night; and more during the summer than winter; more in low, flat countries than in mountainous regions; and less in the interior of continents far removed from rivers, lakes, or the ocean. A slight change in the temperature of an atmosphere, saturated with humidity, produces fogs, clouds, and rains; and by congelation, snow, &c. A continuous evaporation takes place from the ocean, lakes, rivers, and the soil, and a return to the earth in form of dew and rain. The amount of evaporation that takes place in a country is greatly influenced by the operations of the farmer. In a report made by Andrew Brown and Dr. M. W. Dickeson to the American Association, in 1849, those gentlemen remark: "that the annual quantity of rain that falls in the valley of the Mississippi may be estimated at 169,128,960,000,000 cubic feet, which is about 11⅛, or 11.3636, times the quantity which is discharged by the river. There can be but two ways by which this immense quantity of water can make its escape from the valley; one is by the course of the river, and the other by evaporation; 8-91 parts are carried off by the river, and 83-91 parts by evaporation. Thus, we arrive at a fact of the most momentous importance to the planting interests of Louisiana and Mississippi; for it will be at once perceived that the more exhalations are promoted, the less liable will the low or bottom lands of these two States be to the periodical inundations by the river.

"If it be asked by what process it is expected that evaporation can be promoted over such an extensive area as the Mississippi valley, so as visibly and permanently to affect the planting interests of the above-named States; the answer will be found in the fact that the process has been, and is now, in the most rapid and successful progress, and of that kind which is the best calculated to produce so desirable a result, viz: the clearing of such large portions of the valley of its forests for the promotion of agriculture, and the consequent exposure of the lands to the action of the sun and winds, the very best promoters of the evaporating process, particularly on a large scale.

"So rapid is the progress of this increased exposure, and its consequent evaporating tendency, and so visible have been its effects on the Mississippi river, that we may hazard the assertion with safety, that there is not now, by twenty-five per cent., as much water passing down the Mississippi as there was twenty-five years ago; for at and prior to

that time, there were annual inundations of many feet and long periods of submergence of almost all the bottom lands, from the bluffs on one side of the river bottom to those on the other side. Such lands were at that period accounted valueless, and to such a degree that but little or no hopes were entertained of the practicability of their redemption by any artificial means—that is, on any general scale; but such has been the diminution in the annual quantity of water discharged from the valley, that those lands have been progressively and rapidly redeemed from overflow, until very great portions of them are now in the highest state of cultivation, and with but slight assistance from art in the way of embankments, and these such as could not have been at all available against the overwhelming effects of floods and the length of time of their continuance; for then there were annual inundations, both deep and expansive, of the waters, over almost all the bottom lands, but now the river seldom rises to the same elevation as formerly, and when it does, it is of much shorter duration, and the waters are almost exclusively confined to the channel of the river, in place of being spread over almost all the bottom lands the whole spring and early part of the summer."

Such changes are progressing, generally unsuspected and overlooked, but not the less sure.

The art of producing large crops by means of artificial supplies of water has been practised from remote ages in the warm countries of the world. * * * * Virgil tells how to bring down the waters of a rivulet upon the sown corn, and, when suffering from heat, to convey the vivifying liquid from the crown of the declivity, in channels, to the roots of the plants. Columella, Pliny, Cato, Varro, &c., all dwell upon the importance of irrigation. It is found profitable in England to irrigate plantations of willows and other semi-aquatic trees upon dry soils. The efficiency of irrigation is dependent upon many considerations; one of the principal is the nature of the subsoil. When it is a tenacious clay, the preparation consists in suitable under-draining, that would be useless where the subsoil is sand or open gravel.

Some waters are injurious. Certain salts of iron are known to be unfavorable to vegetation. Waters issuing from factories impregnated with animal and vegetable substances, such as the waters of distilleries, breweries, slaughter-houses, &c., are highly fertilizing; others issuing from chemical establishments, calico printing factories, &c., injurious. Salt water in small quantities are may be found useful upon certain plants, such as the grasses, asparagus, &c., while they are positively injurious to such plants as rice. The salt marshes of France are known to produce a superior quality of mutton, which commands a high price, and is known in the French market under the name of "pres salé."

Waters impregnated with carbonate and sulphate of lime are very fertilizing. In certain parts of Germany, a weak solution of sulphuric acid has been employed for irrigating grass lands with great advantage. Those which hold in suspension mud and other detritus, are highly useful, particularly on sandy soils; the fine mud settles in the pores, and gives consistency, but any soil would be benefited by holding mud in suspension, and that, of course, in proportion to the amount of organic and saline matter in the mud.

Sir Humphrey Davy thought that the protection of grasses from frost during the winter season was of great importance, for a meadow irrigated in winter is preserved from sudden alterations, and from the effect of the roots being thrown out of the ground by alternate freezings and thawings. The water immediately in contact with the roots of the grass is rarely below 40° Fahrenheit. In the month of March, in a meadow near Hungerford, the air was, at 7 o'clock A. M., at 29°. The water was frozen above the grass, and the temperature of the soil below the water in which the roots were growing was 43° While the temperature is thus prevented from falling during the winter, it is kept cool during the summer.

Irrigation supposes water in motion; if it be allowed to stand and stagnate, its effects would destroy the objects sought to be accomplished. Instead of fine grasses we would have a growth of carices, junci, and other coarse plants of no value.

Sir John Sinclair says that the advantages of meadow irrigation are chiefly as follows:

First.—With the exception of warping, it is by far the easiest, cheapest and most certain mode of improving poor land, particularly if it is of a dry and gravelly nature.

Second.—Land once improved by irrigation is put into a state of perpetual fertility, without any occasion for manure or trouble of weeding, or any other material expense.

Third.—It becomes so productive as to yield the largest bulk of hay, beside abundance of the very best support for ewes and lambs in the spring, and for cows and other cattle in the autumn of every year.

Fourth.—In favorable situations, it produces very early grass in the spring, when it is doubly valuable.

Fifth.—Not only is the land thus rendered fertile without having any occasion for manure, but it produces food for animals, which is converted into manure, to be used on other lands; thus augmenting, in a compound proportion, that great source of fertility.

The subject of irrigation is one of immense importance in a dry, arid climate, such as characterizes portions of the western plains particularly. It is paramount, and may be employed throughout the continent with advantages greater than any other agricultural application. It is an important art of itself, and one that requires special acquirements for its adaptation.*

The direct action of the fertilizing constituents of water are not the only influences which that substance exerts upon our fields and growing crops. Its simple percolation through a soil has an important influence, by displacing gases and thus creating circulation of air and bringing a fresh supply of ameliorating agents.

A little reflection will teach us to prevent the disastrous consequences of the sudden and powerful rains that fall in our climate. If the ground is cultivated shallow, we must suffer from washing. A hill-side plowed two or three inches would meet with the same fate that we would expect if we were to expose an inclined looking-glass, upon which we had sprinkled sand. The deeper a soil is stirred the better rain will will be absorbed, instead of running off; and the deeper the furrow the longer will the moisture be retained. The alternate influence of showers and sunshine upon deeply-stirred land brings about another important effect, which cannot be obtained without it: we allude to aeration—an influence of great importance, by which not only the organic portions of the soil are, by aid of air circulation, brought into a state of decomposition; but gases are evolved, new combinations formed, the inert mineral constituents are also decomposed, new salts are created, and numerous chemical actions take place, producing active food for plant-life.

It is, of course, necessary to distinguish between a wholesome humidity and destructive saturation; while the one is to be cherished, the other must be avoided. On the subject of under-draining we shall not enter; its importance is too great for a cursory notice in a paper of this kind, and we refer our readers to the many valuable publications written upon the subject.

Liebig makes the following beautiful remarks:

"There is not to be found in chemistry a more wonderful phenomenon, and which more confounds all human wisdom, than is presented by the soil of a garden or field.

"By the simplest experiment, any one may satisfy himself that rain water, filtered through field or garden soil, does not dissolve out a trace of potash, ammonia, silicic, or phosphoric acid. The soil does not give up to the water one particle of the food of plants which it contains. The most continuous rain cannot remove from the field, except mechanically, any of the constituent elements of its fertility. The soil not only retains firmly all the food of plants which is actually in it, but its power to preserve all that may be useful to them extends much further. If rain, or rather water, holding in solution ammonia, potash, phosphoric and silicic acids, be brought in contact with the soil, these substances disappear almost immediately from the solution. The soil withdraws them from the water. Only such substances are completely withdrawn by the soil as are indispensable articles of food for plants. All others remain wholly or in part in solution."

In connection with this interesting subject, it may be remarked that the absorbent power of soils varies according to their composition. It is greater in clays than those which are silicious or sandy, but belongs to all, more or less, not excepting those of a calcareous nature. Liebig tells us that if the phosphate of lime be dissolved in weak carbonic acid water, and the solution filtered

* See Stephens's Practical Irrigator, Smith's Observations on Irrigation, Brown's Treatise on Irrigation, Sir John Sinclair's Code of Agriculture, Voyage en Espagne, par M. Jaubert de Passa, Anleitung zum praktischen Ackerbau von Schwerz, Lr. 1.

through a soil, the phosphate of lime is removed from solution, and the same result takes place with the phosphate of magnesia and ammonia. This is a fact of great agricultural importance, from the constant occurrence of those substances in organic manures.

The complete absorption of potash, ammonia, and phosphoric acid by the soil, and thus entering into combination and forming insoluble compounds, would appear to militate against the received opinion, viz: that plant-food must necessarily be in a soluble state for assimilation. This is contradicted by the above facts. It is, besides, well known that plant vitality has the power, as it were, of corroding insoluble substances, and absorbing them by the roots. Varieties of plants growing upon rocks contain large quantities of the substance of which the rocks is composed. Such is known to be the case with lichens growing on calcareous rocks. Again, the roots of the grape-vine have been found surrounding, and its rootlets insinuated in every manner, through, around, and enveloping a piece of bone, which finally disappears. Nor does it seem that assimilable food should necessarily be soluble, provided it be in a state of atomic division.

It has been stated that the constituents of plants are divided into two classes, organic and inorganic. The first named are derived from water, carbonic acid, nitric acid, and ammonia, and may come from the air through the leaves, or from the soil through the roots. The inorganic constituents are of a different character, and can only be received from the soil and through the roots. It then becomes important that there should be deep preparation of the soil, in order to commingle the surface with that which underlies, that the roots in their search for food, (for it is proved that it does not circulate in the soil as it becomes fixed by combination,) may more readily come in contact with all the substances the plant requires to form the wonderful compound necessary to its growth and development. Deep preparation insures aeration, and the decomposition of the constituents of the soil is thus attained by the action of the atmospheric agents. Both carbonic and nitric acid, which are known to exist in the air and water, have a powerful action upon the soil, but unfortunately our knowledge upon that subject leaves much to be desired.

The importance of minute division of the soil, and the manures which may be added, must, on reflection, be evident to every one. Plants assimilate food in a state of atomic division, and the nearer we approach that point the better; beside which, they will more readily undergo those chemical changes which are ever taking place in Nature's great laboratory, the earth. By breaking the clods mechanically, by exposure to the air, and the freezing effects of water, the mass is pulverized, and thus food, before locked up, is approached and used by the tender roots of the plant.

"Plants cannot obtain from the soil more food than it contains. Further, its fertility is not to be measured by the whole quantity present in it, but only by that portion of the whole quantity which exists in the smallest particles of soil, for it is with such portions alone that the rootlets can come into close contact.

"A piece of bone weighing one ounce, in a cubic foot of earth, produces no marked effect on its fertility. But if this one ounce of phosphate of lime be uniformly distributed throughout the earth, it will suffice for the nourishment of one hundred and twenty wheat plants.

"Of two fields with the same amount of food, one may be very fertile, and the other very unfruitful, if the food is more uniformly distributed throughout the former than the latter. The common plough breaks and turns up the soil without mixing it. It only displaces, to a certain extent, the spots on which plants have already grown, but the spade breaks, turns, and mixes it thoroughly." (Liebig's Letters on Modern Agriculture, p. 108.)

Those plants which reach maturity in a short time are materially affected by the preparation of the soil. Their powers of absorption are much greater in the spring than in the summer, when the leaves are being formed, and when the plant is in the full vigor of growth, than when it has reached its maturity. We have a familiar instance of the importance of preparation in our corn crop, and the stimulus that is imparted to it by constant working, by which food is continually renewed and brought into close contact with the roots, and the soil kept in a well pulverized state, thus increasing its absorbing powers. The descent of water through the soil, and its escape upward as vapor, tend to the same end, and

hence the great importance of underdraining.

Chemists employ sulphuric acid in their experiments for absorbing moisture. Lime and caustic potash are also used. Soils possess the absorbent power in an eminent degree, and it is by that inherent quality that plants are enabled to resist extreme droughts. The power of absorption depends greatly upon division, color, &c. A dark soil absorbs heat more readily than a light-colored one; it also radiates heat quicker. When the sun sets, the earth begins to radiate; in proportion as it cools, will be the amount of dew deposited. When a gas passes to a liquid state, caloric is evolved; such is also the effect when a liquid passes to a solid. The reverse occurs when a solid becomes liquid, or a liquid a gas. By the condensation of vapor, or the formatien of dew, heat is evolved; by the absorption of dew, a further degree of sensible heat is produced. This process prevents a too sudden change of temperature in the surface of the earth, and which otherwise would have been sensibly affected by the too great radiation of heat. This equalization is brought about in a manner to excite our admiration. Evaporation is far more rapid in a dry, than in a moist atmosphere, and more rapid in a current of air than when it is still or stagnant. Dry, porous, and thoroughly pulverized soils radiate heat from a vastly greater number of points than wet and compact soils, and receive more abundant depositions of dew. Sands are powerful absorbents, and some countries depend almost wholly upon this for the support of vegetation. The sandy plains of Chili seldom receive any rain; yet, in consequence of their excessive radiation of heat and the heavy dews at night, they maintain a high fertility. If a soil be sufficiently permeable to the air, condensation may take place below during the day, at the same time that the surface may be giving off both heat and moisture, which is due to the relative degree of heat between the two.

To the farmer and the gardner, the soil is that portion of the earth's surface or crust which supports vegetation, or that is susceptible of cultivation, and is rich or poor accordingly as it is well or illy adapted to production. Soils are formed from the decomposition and disintegration of rocks, and are either from those immediately underlying, or may have been brought from a distance by causes still acting, or that have ceased to operate. * * * * * * The soil has a varied composition, according to locality and circumstance. The decomposition or disintegration of an argillaceous rock would naturally give rise to a soil in which aluminous properties would preponderate. If the soil originated from a silicious rock, then it would be sandy; if from limestone, we should expect it to be calcareous. These and other substances, variously intermixed with organic matters in different states and stages of decomposition, form soils. They owe their properties to the distinctive minerals from which they are derived.

These inorganic constituents do not exist in the atmosphere, and are supplied by the earth, as they do not grow; and having been created once and forever, it follows that, if removed, they must be replaced. It does not matter how removed, whether in the form of grass, grain, milk, flesh, or bone, if taken away they are gone, so far as the farmer is concerned. This principle lies at the foundation of all successful agriculture, and is the fundamental axiom for which Liebig and others have so long, so laboriously and ably contended.

It would be as ridiculous for the miner to suppose that his exhausted placer would yield as much gold by re-working, as for the farmer to think that his exhausted lands would be recuperated without the addition of the substances extracted from it.

All the constituents of soil are compounds: they are oxydes of some metallic base, the organic portions are animal and vegetable substances in a decomposing state, complex and passing by degrees to simple forms. Soils, then, in complexion and composition vary. Two soils originating from the same rock may differ widely, in consequence of mechanical condition, subsoil, situation, climate, and cultivation. But as rocks are the same in all parts of the world, so must they give rise to a similarity of soil. In one hundred and forty-six soils analyzed by the geological surveyor of Massachusetts, taken from every variety of rock formation, the most remarkable uniformity was presented. These, again, as compared with forty-eight soils from Germany, Holland, Belgium, Hungary, and Bohemia, offer the same striking uniforminty, differing but slightly from American soils. (Dana's Muck Manual.) These facts would appear to show that there is not only a great similarity, but that their

composition is independent of the variety of rocks which they overlie. Some of the most fertile are those formed by deposits, and the amount of fertilizing material carried from one spot to another, or entirely lost in the ocean, defies any estimate.

Drs. Dickeson and Brown estimate the annual deposit from the Mississippi river to amount to the enormous quantity of 28,188,053,892 1-6 cubic feet of solid matter. That amount is independent of the coarse sand and gravel transported by the river current, which they were unable to estimate.

Mr. Leonard Horner estimates that "the Rhine carries down every year 1,973,433 cubic yards of earth, and if this process has been going on at the same rate for the last two thousand years, and there is no evidence that the river has undergone any material change during that period, then the Rhine must in that time have carried down materials sufficient to form a stratum of stone a yard thick, extending over an area more than thirty-six miles square."

From the nature of the constituents of silt, and the finely comminuted state in which it is deposited, we should expect it to be fertile; and so long as the deposits continue, so long will their richness remain. Such soils are among the richest known. The low grounds bordering on the Nile, the Mississippi, the Rhone, the Danube, the Po, the Wolga, Orinoco, &c., are examples, and maintain their fertility without apparent diminution. The composition of alluvium depends upon the geological formations and character of the country through which the waters pass; and the nature of the deposit again depends upon the current. If the stream be sluggish, the particles are much finer than if the water be rapid or turbulent. When the uplands of our country have been impoverished by successive croppings or injudicious tillage, the low grounds will resist longer, and continue to be a resource. But the amount of low ground is insufficient to supply the requirements of a dense population; hence the necessity of fertilizers. Organic manures, those of a nitrogenous nature, have been used from time immemorial. It is said "that the barn-yard yields a panacea for all the farmer's ills." This is not rigorously correct; for there are soils which never can be rendered fertile by the application of barn-yard manure, but which may be improved by correctives, and the addition of organic substances.

[*To be Continued.*]

From American Stock Journal.

Cattle Distemper.

[This disease is spreading at the North, and although the most summary means for exterminating it, have been adopted by the Massachusetts Legislature, it is feared that it will not be arrested in its progress until great national loss shall have resulted from its ravages. We present the reader with the able verterinary surgeon Dr. Dadd's description of the symptoms, name, &c., of the disease.—[ED. SO. PL.

The Pleuro-Pneumonia Exudative.

DESCRIPTION AND SYMPTOMS OF THE DISEASE.

The locality of pleuro-pneumonia exudative is within the chest, the parts affected are the lining membrane of the thoracic cavity and the thoracic viscera. The disease sometimes commences on the pleural membrane which is found on the interior walls of the chest and on the surface of the lungs —it then occasions much pain, as in common pleurisy, and is accompanied by a deep seated and painful cough; as the disease progresses the chest becomes the seat of exudation of serum and lymph, the walls of the chest acquire a coating of lymph which undergoes the usual change and becomes organized into tough fibrine, and this becomes so firmly united to the pleura, that it requires considerable force after death to tear it off; not only does it occupy the plura-costalis, but is also found on the diaphram. As the water—serum—lymph and fibrous tissue accumulate, it gradually compresses the lung, on whichever side the foreign materials happen to occur, until the lung itself, if unaffected by the disease, is forced up into the superior or uper region of the chest, and finally the mechanical pressure is so great that the lung is forced into a solid ball no bigger, in some cases, than a man's first, and under such circumstances some persons are led to suppose that the lung is not to be found—"all gone."

It happens occasionally that while one side of the chest is filling up with serum,

&c., the lung on the other side is being filled with exuded lymp, and is gradually undergoing solidification, so that after a while, the lungs fail to eliminate carbonic acid gas from the blood and impart to it oxygen, and then the animal dies.

In some cases the disease first commences in a purely pulmonic form affecting the substance of the lung and then attacking the pleura; whenever it occurs in what is called a "high inflammatory form," it usually runs a rapid course and ends in mortification of the lungs; yet during my visits at North Brookfield, I have not seen more than two cases of mortification of the lungs.

The disease sometimes occurs in the non-inflammatory form, and in character exudative, and lingers in the system for months, yet during this period it may escape ordinary observation, and the owner of the animal may declare that there is nothing amiss with the creature. Such was the case with a young bull, killed a short time ago, and the young cow also, two out of the three animals purchased at Belmont last June.

Very many of the animals slaughtered under the auspices of the surgeons employed by the commissioners, had tumors in their lungs; these tumors consisted of portions of detached lung, circumscribed spots, in which the disease in its active form originally existed, some of these so called tumors weighed from one to twenty-four pounds! Whenever we found a tumor, it was always adherent to the chest, or rather, the lining membrane of the same, and was enveloped in a dense fibrous covering or tunic, by which means nature preserved the integrity of the sound portion of the lung; the object in uniting the tumor with the pleura, is to organize it with arteries and veins, which are thrown out from the pleura, so that the diseased mass may be absorbed by the blood, and carried out of the system by the excrementitious vessels and organs; and it is in this way that nature by the silent operation of her own forces attempts, and finally very often succeeds, in curing disease.

These diseased spots or tumors are detached from the sound part of the lung by what is called the ulcerative process, and as fast as ulceration proceeds, the adjacent parts are protected by deposits of fibrine, which effectually seal up the open air cells and blood vessels, so that the tumor—*originally real lung tissue*—immediately escapes when the process is completed, and the part is cut into.

Occasionally we find the lung or a portion of one or both lobes in a state of hepatization, which signifies liver-like; there are two kinds of hepatization, one is called red, the other grey; on cutting through them they feel like liver, and when a portion is put into water it sinks.

SYMPTOMS OF THE DISEASE.

The old saying is that "in dry times all signs fail," so it is with exudative pleuropneumonia, when it assumes a mild form; when it first appeared at Belmont, and afterwards at North Brookfield, it was in the acute form, and in spite of all treatment run a rapid course; its symptoms were then somewhat uniform—for example, it was ushered in by a short, dry, husky cough, and the animal on being urged to move showed symptoms of distress; the respirations were accelerated; the pulse quick and wiry; the animal dull and listless; the bowels constipated; the milk decreased in quantity and of a yellow tinge, and the appetite is not so good as usual.

Now the disease has assumed a milder form, being modified by passing through the systems of various herds, consequently the "signs fail," yet let the disease be in ever so mild a form the creature shows unthriftiness, appears dull and has a languid look; the hair in some parts of the body stands on end; the respirations are quickened, as well as the pulse, yet the appetite is not impaired, in fact there is no complaint made about an animal's appetite except when the disease commences in the form of pleurisy, in which case very little food is eaten, and if the animal be pressed in the spaces between the ribs, it shows signs of pain. It will generally be found that in the acute stage there is considerable tenderness all along the spine, and the moment a person's hand is placed in that vicinity the affected creature will shrink. The horns and extremities are alternately hot and cold; urine dark colored and scanty; fæces darker than usual. Yet when the disease takes on the incipient form, the work of destruction goes on in so mild a manner that it eludes detection, until auscultation or percussion reveals it.

AUSCULTATION AND PERCUSSION.

On applying the ear to the sides of the chest, if any uncommon sound be heard, such as a bellows murmur, or a strong tubular murmur, or a crackling sound, we may conclude that the lungs or their respiratory passages are diseased; also should the respiratory murmur be absent, and on striking the sides of the chest a dense, almost solid sound be heard, then we may infer that the lung or lungs, as the case may be, are undergoing solidification. Let it be borne in mind however, that the natural and healthy sound should resemble that of the air entering into a vast number of minute cells—having, as each cell becomes gradually dilated, a soft, smooth, grating or crepitating sound; the term vesicular has been applied to this sound, because it is supposed to be produced by the entrance of air into the pulmonary vesicles, and it is very distinctly heard in the case of sound lungs where the walls of the chest are thinnest.

A compressed or solidified lung gives the walls of the bronchial tubes an increased power of vibrating sound, hence in such cases the ear of the auscultator detects what is called tubular respiration.

When a portion of lung is infiltrated or compressed, or when the chest contains serum, we get what is called *puerile* or shrill respiration on the side opposite to that affected, in fact, whatever is capable of preventing the free access of air into the minute air-cells of one lung imposes additional labor on the other, hence the shrill sound or exaggeration of the respiratory murmur. When effusion into the chest is very great, or when the pleura becomes coated with lymph or fibrine, or the animal has a thick hide, or is very fat, then the respiratory murmur is feeble.

PERCUSSION.—The application of percussion (striking various parts of the chest with the joints of the fingers) is sometimes of great value in detecting resonance or dullness of any part of the chest, yet when applied to the region of the shoulder and along the back, which are covered with thick muscles, it is apt to fail in detecting disease. When we strike the walls of the chest, supposing the subject to be free from disease, we get a clear sound, but as we approach the liver on the right side which reaches as far forward as the third or fourth rib, from behind, we get dullness. In many of the cases which I have had the privilege of inspecting at North Brookfield, I have on examination after death found the lungs in a state of hypertrophy (abnormally enlarged), and in all such cases the sound elicited by percussion resembled that which would arise on striking a boiled pudding contained in a bag; in fact, the lungs when in a state of hypertrophy from this disease, ere they have lost their integrity of structure, feel almost like boiled pudding.

In pleuro-pneumonia, the lungs are often emphysematous; this gives rise to a tympanic or windy sound, the lung is then unnaturally resonant—the extent of the resonance corresponds to that of the dilatation of the air cells; on the other hand, should the lung be occupied by a tumor, such as I have just described, percussion will elicit diminution of clearness, and should the tumor have an adhesive connection with the inner wall of the chest, the dullness will be very marked, or rather the absence of sonorous sound is complete.

I have noticed that the autopsies reveal little, if any, derangement of other parts or organs of the body; and I have made up my mind, after conducting or assisting at over one hundred autopsies, that if any other organs of the body are affected the case is not 'pleuro-pneumonia exudative," the veritable malady imported from Holland in May, 1859.

Charcoal as a Manure.

Manures may be beneficial to plants by affording carbonic acid gas to their roots. Animal and vegetable matters evolve this gas while purifying; but we are not aware of any manure that absorbs it from the atmosphere, so as to be for that reason beneficial to vegetation. Lime attracts carbonic acid gas from the air rapidly, but combines with it so strongly, that it is useless to the plant until the carbonate of lime so formed is imbibed and elaborated by that plant.

It is to its power of gradually forming carbonic acid gas that *charcoal* partly owes its value as a manure. The chemical operation of charcoal, when employed for this purpose, is by no means so well understood as that of most other fertilizing additions to the land. That the carbon of the charcoal operates so beneficially upon plants, among other modes by a gradual combination with

oxygen, hardly admits of a doubt. Liebig gives the results of a series of experiments by Lukas on the use of charcoal as a manure, which seems to corroborate his opinion. From the facts which these chemists, however, adduce, it is evident that the beneficial action of charcoal, as a fertilizer, depends upon the presence of other substances besides carbon. Liebig notes (*Organic Chem.*, p. 62) that "plants thrive in powdered charcoal, and may be brought to blossom, and bear fruit, if exposed to the influence of the rain and the atmosphere. Plants do not, however, attain maturity under ordinary circumstances in charcoal powder when they are moistened with pure distilled water instead of rain or river water. Rain water must, therefore, contain within it one of the essentials of vegetable life; and it has been shown that this is the presence of a compound containing nitrogen; the exclusion of which entirely deprives humus and charcoal of their influence on vegetation." It is ammonia, to whose presence in rain water Professor Liebig thus refers, in whose valuable work (p. 207) the experiments of Lukas will be found. From these we learn that in a division of a low hothouse, in the Botanic Garden at Munich, a bed was set apart for young tropical plants; but instead of being filled with tan, as is usually the case, it was filled with powdered charcoal, the large pieces of charcoal having been previously separated by means of a sieve. The heat was conducted by means of a tube of white iron into a hollow space in the bed, and distributed a gentle warmth, sufficient to have caused tan to enter into a state of fermentation. The plants placed in this bed of charcoal quickly vegetated and acquired a healthy appearance. As always is the case in such beds, the roots in many of the plants penetrated through the holes in the bottom of the pots, and then spread themselves out; but these plants evidently surpassed in vigour and general luxuriance plants grown in the common way; for example, in tan.

M. Lukas then gives a list of several of the exotic plants upon which charcoal appears to have produced the most beneficial effects. It appeared also to promote the rapid germination of seeds. He then proceeded to try the effects of charcoal when mixed with vegetable mould, all of which answered very well. "The charcoal," continues M. Lukas, "used in these experiments was the dust-like powder of charcoal from Firs and Pines. It was found to have most effect when allowed to lie during the winter exposed to the action of the air. In order to ascertain the effects of different kinds of charcoal, experiments were also made upon that obtained from the hard woods and peat, and also upon animal charcoal; although I foresaw the probability that none of them could answer so well as that of Pine wood, both on account of its porosity and the ease with which it is decomposed. The action of charcoal consists primarily in its preserving the parts of plants with which it is in contact, whether they be roots, branches, leaves, &c., unchanged in their vital power for a long space of time, so that the plant obtains time to develop the organs for its further support and propagation. There can scarcely be a doubt, also, that the charcoal undergoes decomposition; for, after being used for five or six years, it becomes a coaly earth. It exercises likewise a favourable influence by absorbing and decomposing the matters excreted by the roots of plants, so as to keep the roots free from the putrifying substances, which are often the cause of the death of the spongioles. Every experiment," concludes M. Lukas, "was crowned with success, although plants belonging to a great many different families were subjected to trial."—(*Ibid.*, *p.* 211.)

Professor J. F. Johnston (*Elm. of Ag. Chem.*, p. 142) recognizes the good properties of charcoal as "a valuable mixture with liquid manure, night-soil, farm-yard manure, ammoniacal liquor, or other rich applications to the soil." And as he observes in another place, when speaking of the fertilizing portions of farm-yard drainage, (*Trans. High. Soc.* 1846, p. 190,) "The only substance at present known, by which the separation of all the valuable ingredients from liquid manure can be fully effected, is animal charcoal. A sufficient supply of this substance, when intimately mixed with the liquid manure, will take up nearly the whole of the saline and colouring matters it holds in solution, will carry down the substances it holds in suspension, and will leave the water nearly pure and colourless. The refuse of the prussiate of potash manufactories will have this effect, and what remains when ivory-black is digested in spirit of salt (muriatic acid)

will do still better; but this kind of charcoal is neither cheap nor abundant, and, therefore, cannot be recommended for general use. The refuse animal charcoal of our manufactories is now sold for manure at the price of several pounds a ton: either those who sell it, or those who use it, might render it still more valuable by causing fermenting liquid manure to filter through it before it is applied to the land.

"But other kinds of charcoal possess this property to a certain extent: wood charcoal, reduced to powder, charred sawdust, and charred peat, are all capable of being used with advantage in extracting the ammoniacal and other salts, which give its value to the liquid of our farm yards. Experiment has shown that when filtered through a bed of such charcoal, the liquid escapes without colour, and almost without taste, while the charred peat or sawdust is converted into fertilizing manure. A great portion of the loss now incurred may be prevented by the use of such kinds of charcoal; and the fertilizing substance may, through their means, be applied to our crops at seasons of the year for which, in their liquid form, they are not suited. It is even capable itself of yielding slow supplies of nourishment to plants; and it is said in many cases, even when unmixed, to be used with advantage as a top-dressing. In moist charcoal the seeds of the gardener are found to sprout with remarkable quickness and certainty, but after they have sprouted they do not continue to grow well in charcoal alone."—(*C. W. Johnson's Modern Agricultural Improvements.*)—J., *in Cottage Gardener.*

REMARKABLE SPRING.—In Greene Co., Virginia, there is a remarkable natural curiosity, known as the "Tidal Spring." The water issues out of the ground in a bold stream, sufficiently strong to turn a grist mill, and it continues to flow for fifteen or twenty minutes, when the water ceases to run, and in two minutes' time not a single drop of water is visible In the course of an hour or two the water commences flowing again, and flows twenty or thirty minutes, when it again ceases. In wet weather it flows every hour, and in dry weather it flows seven or eight times every twenty-four hours.

Grain fed to stock is much better when cooked

Measuring Land.

Farmers often desire to lay off small portions of land for the purpose of experimenting with manures, crops, etc.; but sometimes find difficulty in doing it correctly, for the lack of a few simple rules. The following table and accompanying explanation, which we copy from the *New England Farmer*, carefully studied, will make the whole matter perfectly clear.

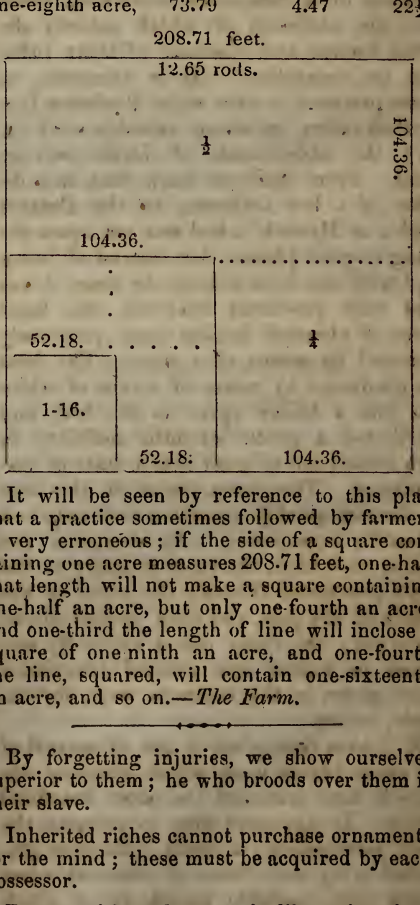
One Acre contains 160 square rods; 4,840 square yards; 43,560 square feet.

One Rod contains 30.25 square yards; 272.25 square feet.

One square yard contains nine square feet.

THE SIDE OF A SQUARE TO CONTAIN.

	feet.	rods.	paces.
One acre,	208.71	12.65	64
One-half acre,	147.59	8.94	45
One-third acre,	120.50	7.30	37
One-fourth acre,	104.36	6.32	32
One-eighth acre,	73.79	4.47	22½



It will be seen by reference to this plan that a practice sometimes followed by farmers is very erroneous; if the side of a square containing one acre measures 208.71 feet, one-half that length will not make a square containing one-half an acre, but only one-fourth an acre, and one-third the length of line will inclose a square of one ninth an acre, and one-fourth the line, squared, will contain one-sixteenth an acre, and so on.—*The Farm.*

By forgetting injuries, we show ourselves superior to them; he who broods over them is their slave.

Inherited riches cannot purchase ornaments for the mind; these must be acquired by each possessor.

Beauty without honesty is like poison in a box of gold.

An Address

On the Opposite Results of Exhausting and Fertilizing Systems of Agriculture, Read Before the South Carolina Institute, at its Fourth Annual Fair, November 18th, 1852.

BY EDMUND RUFFIN, ESQ.

Concluded from page 408 Sou. Planter.

From this digression to a particular branch, I will now return to the general subject, of the neglect of rest and manuring crops, for land.

The incessant cultivator does not the less rest, and lose the use of his land, by refusing any cessation of tillage so long as he can avoid it. If such cultivators manure so abundantly that there is no general decline of production, then they do not come under my past remarks and censure. If there be any such, I will only say of their mode of maintaining fertility, that it is less effectual and more costly, than if aided and substituted in part by manuring crops and a judicious rotation of crops. But as to many other planters, who, whether slowly or rapidly, are certainly impoverishing their lands, they will, at some future period, be compelled to allow a greater proportion of time for the land to rest, and to greater disadvantage, and less profit, than if allowing regularly either one year in three or two in five. Suppose the land to yield cotton, (or sometimes corn,) continuously for thirty, or even forty years—or, with much manuring, sixty years. In such cases, it is true, there were as many crops obtained as the land was kept years for tillage. But after the first few years, the products were declining; and for the last five or ten years, on the general average, they scarcely paid more than the expenses of cultivation. The crops also suffered during the whole time the evils of a want of rotation, and the land of want of change of condition. At the close, the land must be turned out to rest, because manifestly, not worth longer cropping. This compelled cessation and rest will continue for twenty, thirty, or forty years, when the land will be again cleared of its second (or perhaps its third) growth of trees; and with this and other extra labors, will be again brought under continued tillage, to be again, and much more speedily, exhausted of its smaller recovered amount of productive power. In this manner, though at long intervals, more than the full proportion of rest, required by an improving system of rotation, is given to the land, and enforced by its exhaustion; and the manner is such as to make the least return of benefit for the greatest expense incurred for the respite of the land from cultivation.

My former engagement in South Carolina, and the then especial object of my investigations and labours, served to make me better acquainted with a large portion of your territory than any other as extensive elsewhere. From that acquaintance was derived the opinion, which I have since asserted and still maintain, that no other as extensive region, known to me, possesses half as great advantages and resources for agricultural improvements, or more needs the employment of these means. The proper and full use of your wonderfully abundant, rich and easily accessible marl, and the recent shells and other marine remains, offer the best principal and indispensable means of fertilization, and which are available for half your territory. Another great resource, and almost as much neglected, is presented in your great inland swamps, now only wide-spread seed-beds of disease, pestilence and death; and which, by drainage, with certainty and great profit, might be converted into dry fields of exuberant fertility. It is true, that existing legal obstacles oppose these extensive plans for drainage; but these difficulties might be removed by wise legislation, with great benefit to the interests of all concerned—and improvements might be permitted and invited which would render these now worthless and pestilential swamps as fruitful as the celebrated borders of the Po.

The draining of the inland swamps of rich alluvial soil, together with the general application of marl to these and also to the now cultivated higher ground, would go far to remove the long prevailing unhealthiness to which Lower South-Carolina is subject, and which is the only important evil which is not entirely in the power of the inhabitants to remedy. I will not presume to say how far this great evil may be lessened by these works of industry and improvement. But, when so much of your country consists of low and wet swamp, and of partially wet, higher lands, and all easy to be drained, it does not seem over-sanguine to suppose, that, with such drainage and the general extension of the also sanitary operation of marling and liming, the country

would be as much improved in healthiness, as in fertility. Such change to greater healthiness has been most marked in my own country, in the extensively marled neighbourhoods, even where there has been no considerable draining operations executed or required. This improvement of health, is ascribed by all who have experienced the beneficial change, mainly to the sanitary influence of the now calcareous soil.

Your extensive and rich river swamp lands offer another great object for improvement, and increase of agricultural profit and wealth. Even "sandy pine barrens," now unfit for tillage, or for any useful production, other than the magnificent pine forests which cover them, if made calcareous and put under Bermuda grass, (the curse of tillage lands so infested) would be made as valuable land for pasturage, as the equally barren chalk downs of England.

Your high lands are mostly level, or of gently undulating surface, and easy to till, and the soils generally well suited to your great staple crops, corn and cotton. The navigable rivers which pervade Lower South Carolina, in their number and character, present a remarkable geographical feature, as singular as it is valuable. The main canals required for extensive drainage of the inland swamps, would be so many additions to the existing navigable highways. So low are the intervening swamp lands, that nearly all the deep navigable rivers, might be connected by canals of level or nearly level water; and in that respect, Lower South-Carolina might possess the peculiar facilities of Holland for extensive inland navigation. These connecting canals, by diverting some of the superfluous supply of fresh waters of some rivers, to others where it is deficient, might perhaps serve to extend greatly the present area of tide covered land, capable of being flooded for rice culture. If such canals, mainly for drainage, but serving also for navigation, were made to connect the Edisto with the Ashley, the Cooper and the Santee, there would be another incidental advantage as remarkable as it would be valuable. The excavation of the canals through the great swamps, (and certainly between those stretching from the Ashley nearly to the Santee,) would generally penetrate into marl of the richest quality, lying a few feet below the surface of the swamps. If duly appreciated, this rich calcarious earth, to be used as manure, would go far to reimburse the costs of the excavation; and if used for lime-burning, would furnish good lime, and at one-third of the price of that for which South-Carolina has paid and continues to pay millions of dollars to the lime-burners of New-England. This voluntary tribute, at least, which is one of so many unnecessarily paid by the South to the North, might be ended to the immediate and great profit of both the sellers and the buyers of the substituted lime, made of the abundant, cheap and excellent native material. The buying of Northern lime by South-Carolina and Georgia, is as unprofitable and as absurd a procedure as the usage of importing Northern hay. But of these and of many similar things, we of the South have no right to blame any but ourselves. All the commodities which we import from the Northern States, and which might be more cheaply provided at home, serve indeed to make up an enormous amount of annual tribute. But this part of our general burden is fairly and properly levied by northern enterprise and industry upon southern listlessness and indolence. Very different, however, is the case as to the far greater proportion of the general amount of tribute paid by southern to northern interests—from which we have no defence, because government induces and enforces the payment, by the legislative machinery of protecting duties and the indirect bounty system. But I am straying from my designed subject, the improvement of southern agriculture to its governmental and political oppression.

Putting aside all speculative and untried subjects and modes of improvement—and counting upon nothing more than the proper use of your calcareous manures and judicious tillage, and the early results of both—and supposing that your country should be so benefitted only in the same degree as has been the small portion of mine already marled or limed—the most moderate estimate of the agricultural values so to be created would now appear to you to be so greatly exaggerated as to be altogether incredible. But however much I would desire to avoid the position of a discredited witness, I will not be restrained by that fear from stating general results, which are notorious in Virginia, and to sustain the truth of which, thousands of particular facts can be adduced. These results, susceptible of clear proof, or exhibited by official documents, are that thousands of farms have been dou-

bled or trippled, and some quadrupled in production, and the general wealth of their proprietors as much increased—the assessed values of marled lands increased by many millions of dollars, while those of similar lands, not so treated, have continued to decline as all did before; and the treasury of the commonwealth is already benefitted by many thousands of dollars received annually from the counties containing these improved lands, and derived from them, while the revenue from lands of the neighbouring and before similar counties, is still decreasing.

So far, I have spoken as to benefits which have already occurred, and which are unquestionable, and which have been derived from resources and facilities for improvement not to be compared in amount and value with those of South-Carolina. I have elsewhere estimated the possible future and full fruition of this system of improvement, in Lower Virginia only, at five hundred millions of dollars of increased pecuniary value of capital thereby to be created. The full employment of your much greater resources of this kind, and over as wide a surface, would not be worth less. Then your other great resources, which have been named but not estimated, would be so much more in addition.

But agricultural production and pecuniary values are not the only or the greatest gains; and though others rest upon opinion only, and are incapable of being measured, their existence and their value are not the less acknowledged by all judicious observers, in our country most improved in agricultural production by calcareous manures. The improvement of health has been mentioned; the improvement of economical and social habits, morals and refinement, and better education for the growing generation, have been sure consequences of greatly increased and enduring agricultural profits; and these moral results will hereafter be increased, in full proportion to the physical and industrial producing causes. Population, though a later effect, is already sensibly advanced by these agricultural causes. The strength, physical, intellectual and moral, as well as the wealth and revenue of the commonwealth of Virginia, will soon derive new and great increase from the growing improvement of that one and smallest of the great divisions of her territory, which was the poorest by natural constitution—still more the poorest by long exhausting tillage—its best population gone, or going away, and the remaining portion sinking into apathy and degradation, and having no hope left, except that which was almost universally entertained of fleeing from the ruined country, and renewing the like work of destruction on the fertile lands of the far west. Terms of reproach and contempt, (once not undeserved,) have been so long and so freely bestowed on this tide-water region of Virginia, and had become so fixed by use, that it will be long before they will cease to be deemed applicable; or before many persons who now know this region, only by the memory of former report, will learn that it is not altogether a land of galled and gullied slopes, or broom-sedge-covered fields, over whose impoverished and dwindling population, indolence and malarious disease contend for mastery.

From these matters, referred to for proof or illustration, I return to my main subject, more immediately connected with, and more likely to be interesting to my auditors.

There is not one of the industrial classes of mankind, more estimable for private worth and social virtues, than the landholders and cultivators of the Southern States. With them, unbounded hospitality is so universal, that it is not a distinguishing virtue—and, in truth, this virtue has been carried to such excess, as to become a vicious tendency. Honourable, high-minded, kindly in feeling and action, both to neighbours and to strangers—ready to sacrifice self-interest for the public weal—such are ordinary qualities and characteristics of southern planters. Many of the most intelligent men of this generally intelligent class, are ready enough to accept and to apply to themselves and their fellow-planters, the name of "land-killers." But while thus admitting, or even assuming this term of jocose reproach, they have not deemed as censurable or injurious, their conduct on which this reproach was predicated. They have regarded their "land-killing" policy and practice merely as affecting their own personal and individual interests—and if judged by their continued action, they must believe that their interests are thereby best promoted. Their error, in regard to their own interests, great as may be, is incomparably less than the mistake as to other and general interests not being thus affected. As I have already

admitted, individuals may acquire wealth by this system of impoverishing culture, though the amount of accumulation is still much abated by the attendant waste of fertility. But with the impoverishment of its soil, a country, a people, must necessarily and equally be impoverished. Individual planters may desert the fields they have exhausted in South Carolina, and find new and fertile lands to exhaust in Alabama. And when the like work of waste and desolation is completed in Alabama, the spoilers, (whether with or without retaining a portion of the spoils,) may still proceed to Texas or to California. But South Carolina and Alabama, must, nevertheless, suffer and pay the full penalty of all the impoverishment so produced. The people who remain to constitute these States respectively, as communities, are not spared one tittle of the enormous evils produced—not only those of their own destructive labours, but of all the like and previous labours of their fellow citizens and predecessors who had fled from the ruin which they had helped to produce. And these evils to the community and to posterity, greater than could be effected by the most powerful and malignant foreign enemies of any country, are the regular and deliberate work of benevolent and intelligent men, of worthy citizens, and true lovers of their country.

I will not pursue this uninviting theme to its end—that lowest depression which surely awaits every country and people subjected to the effects of the "land-killing" policy. The actual extent of the progress toward that end, throughout the Southern States, ought to be sufficiently appalling, to induce a thorough change of procedure and reformation of the agricultural system of the South.

In addition to all increase of the other benefits of agricultural improvement which have been cited—pecuniary, social, intellectual and moral—there would be an equal increase of political power, both at home and abroad, which at this and the near approaching time, would be especially important to the well-being and the defence of the Southern States, and the preservation of their yet remaining rights, and always vital interests. If Virginia, South Carolina, and the other older slave-holding States, had never been reduced in productiveness, but, on the contrary, had been improved according to their capacity, they would have retained nearly all the population they have lost by emigration, and that retained population, with its increase, would have given them more than a doubled number of representatives in the Congress of the United States. This greater strength would have afforded abundant legislative safeguards against the plunderings and oppressions of tariffs to protect Northern interests—compromises (so-called) to swell Northern power—pension and bounty laws for the same purposes—and all such acts to the injury of the South, effected by the greater legislative strength of the now more powerful, and to us, the hostile and predatory States of the confederacy. Even after Virginia, with more than Esau-like fatuity, had sacrificed her magnificent north-western territory, which now constitutes five great and fertile States, (and a surplus to make, by legislative fraud, a large part of the sixth State,*) and all of which are now among the most hostile to the rights of the people of the South—if Virginia had merely retained and improved the fertility of her present reduced surface, her people would not have removed. Their descendants would now be south of the Ohio, ready and able to maintain the rights of the Southern States, instead of a large proportion, as now, serving to swell the numbers, and give efficient power to our most malignant enemies. The loss of both political and military strength, to Virginia and South Carolina, are not less than all other losses, the

* A condition made by the Government of Virginia, in the act of cession, to the United States of all her north-western territory, was that this territory should afterwards be divided into not more than five new States. Five have already been carved out of this great domain, Ohio, Indiana, Illinois, Michigan, and Wisconsin, and a space of 22,336 square miles remains, in the new territory of Minnesota, which will hereafter constitute so much of another State, in violation of the act of cession by Virginia, and of the faith of the present Federal Government, and in which space, with all the north-western territory, slavery was interdicted by the ordinance of 1787, of the Confederation. This space of 22,336 square miles, which ought to have been included in the five anti-slavery States already formed, but which will go to constitute a sixth, is nearly as large as South Carolina, and larger, by nearly 1000 square miles, than the united surfaces of New Hampshire, Massachusetts and Connecticut.

certain consequences of the impoverishment of their soil.

If it were possible that, for all lower South Carolina, the system of improvement could be directed by one mind and will, as much as the operations of any one great individual estate, the most magnificent results could be obtained with great and certain profit, and in a few years. Without any additional labour or capital, more than now possessed, for beginning the improvement—and with only the subsequent increase of means which would be supplied by the clear profits of the improvements as they became productive—most of the lands accessible to marl or lime could be covered by these manures in ten years. In twenty years from this day, all such lands could be thus improved, and, by that time, might yield double or tripled general products, and would exhibit a proportionally greater increase of value as capital. The new clear profits of this one great improvement would be enough in amount to effect all the practicable drainage of inland and river swamps in twenty years more. Or, in that additional time, the increased revenue of the State treasury, from these new sources only, would suffice to construct all the great works of drainage, which would be beyond the means of individual proprietors.

In all opinions expressed as to the value and effects of the agricultural improvements proposed for South Carolina, my data are the experienced and unquestionable results of like labours in Virginia. The legitimate deductions, and the only one for untired operations is that like causes will produce like effects in both these different localities. I cannot conceive any reason, founded on existing differences of climate, soil or subjects of culture, that can make calcareous manures less efficient, or less profitable, with you than with us. Nevertheless, I have learned from mere rumour, that in the small extension of their use, by new operators, which occurred here, there was no general and important benefit obtained. And such, I must infer, was the conclusion reached by nearly all the makers and observers of these trials, from the irresistible, though negative evidence (which only is before me,) that nothing considerable of such improvements, or of public notoriety, has been effected in latter years. In the absence of all particular information of the actual trials, their results and the accompanying circumstances, of course I cannot pretend or be expected to explain the causes of disappointment, which must be the general result, as it seems that marling has languished, if not ceased, in general, after a few faint efforts.* But I infer that the main and usual cause of supposed failure, or of inconsiderable benefit, has been the same prevailing bad practice, before denounced, of incessant, or, at least, much too frequent tillage, which does not permit the fields to receive and retain organic matter from their own growths especially. This cause had operated on nearly all the trials of marl made previous to my service in South Carolina. Of all such cases of alleged failure, that I was enabled to see and investigate the circumstances, the causes were such as I now suppose of the still later failures. These cases of failure and of disappointment, and the known causes, were brought fully to view in my Report of the Agricultural Survey; and from the more extended remarks, I will quote a short passage, to show my then opinion of the facts and the causes of previous failures, and my earnest warning against the general course pursued. After reciting the general facts of failure of previous trials of marling, I proceeded in these words: "Can any opponent of marling desire more full admissions than these? And yet they all serve but to illustrate what I have continually striven to impress, *that without vegetable matter to combine with, calcareous manures will be of little value.* But, on the other hand, I have heard of no trial of marl on land in proper condition, that is, recently and sufficiently rested, and thereby provided with vegetable matter, in which the effect has not been very great *on the first crop.* And three or four of such results only, would be enough to explain the causes, (of failure in all other cases,) and to prevent all inferences unfavourable to marling, if from a hundred failures of early efforts under reverse circumstances." Then followed particular statements of two different experiments, carefully made that year, (and the circumstances noted at my request,) of marling

* There is, however, one important case known to me, of at least partial exception to the general rule of failure in marling in South Carolina, in the very extensive and also profitable labours and improvements of Gov. Hammond, on his estate bordering on the Savannah.

on new land, and, therefore, not exhausted of its valuable matter, and in which the products (which were cotton) were nearly doubled in the first year of the application.

Here, then, even in the few lines quoted from the much more full precepts to the same purport, there is full evidence of my having stated, in advance of all later trials, the sure cause of failure; and in the warning against that cause, I may claim to have predicted all later failures of like occurrence. And if there had been thousands of failures, preceded and accompanied by very frequent and exhausting tillage, all of them would but the more strongly confirm my long entertained and often expressed opinions and instructions as to the action of calcareous manures; and all such cases would not detract a tittle from the alleged available values. When urging the use of lime, I have never omitted to state that it gave no fertility of itself, or by direct action; and that vegetable matter in sufficient quantity, and in conjunction, was essential to the beneficial operation of calcareous manures. The required organic matter may be supplied mainly in the growth of the land to be improved. But it *must* be supplied in some form, and in sufficient quantity—and, also, should be, in part, present in advance of the use of calcareous manures, to secure their best early effects.

Planters of South Carolina—I have offered to you in plain and unvarnished language, and, possibly, it may be in ungracious and distasteful terms, the last advice and admonition that I can expect to utter to you, or to any similar audience. My burden of years, and infirmities much greater than even suited to my age, admonish me that my labours may soon close. I would deem it a reward of more value to me than will be the short remainder of my life, if you and your fellow-labourers, even at this late time, (in reference to myself,) would heed my words, and fully profit by them. It is but little that a private individual can do, to warrant to a great commonwealth or community, the beneficial results predicted upon stated premises and conditions. But so perfect is my confidence in the general results I have predicted, that I would willingly hazard upon the issue all that I have, in property, reputation, and even life itself. For illustration, and in mercantile or business language—if I possessed hundreds of millions of dollars, to that full amount, for a premium of ten per cent., I would insure as much clear profit to South Carolina, to be gained by conforming to my directions, for saving and increasing the fertility of her soil. As, however, it is impossible for me to offer any such guaranty, and for me either to incur risk or loss, or to derive pecuniary gain from the results, I can only offer my earnest verbal assurances of your available gain, as great and as sure to be obtained by your pursuing a proper course of improvement, as will be the growing loss and eventual ruin of your country, and humiliation of its people, if the long existing system of exhausting culture is not abandoned. It is not merely my feeble voice and my questionable personal testimony, but also thousands of unquestionable facts, and the sure experience and realized profits of thousands of farmers, which offer to your acceptance the highest agricultural prosperity in exchange for present decline and approaching exhaustion of the remaining fertility of your land. Choose, and choose quickly! And remember, as my last warning, that your decision will be between your purchasing, at equal rates of price, either wealth and general prosperity, of value exceeding all present power of computation, or ruin, destitution, and the lowest degradation to which the country of a free and noble minded people can possibly be subjected.

From the Valley Farmer.

Remarks on Liebig's "Letters on Modern Agriculture," &c.

By ROBERT PETER, M.D., Chemist to Geological Survey of Kentucky, &c.

"Letters on Modern Agriculture, by Baron Von Liebig. Edited by John Blyth, M.D., Professor Chemistry, Queen's College, Cork; with addenda, by a Practical Agriculturist, &c. New York, John Wiley, 1859. 12mo. pp. 275."

One of the objects of the present work of Liebig, is to show that the great efforts made by the modern agriculturists, to secure large crops and great present profit from their land, result (because of the present imperfect system of culture) in a proportionably more rapid spoiliation of the soil.

Were it true, according to the recent views of some of the leading chemists and agriculturists, that *Nitrogen*, which is present

in immense quantity in the atmosphere, is the *essential element* of the soil and of manure which insured the production of crops; or that humus, which is also composed of abundant *atmospheric elements*, viz.: carbon, oxygen and hydrogen, is, with nitrogen, an all-sufficient food for vegetables, and that the earthy materials of the soil acted merely mechanically or physically, in furnishing a soft penetrable medium in which their ramified roots could diffuse themselves, and by which moisture, air, gasses, heat, and the decomposed remains of plants and animals (humus) are absorbed and retained for their use:—then, a system of husbandry which kept the soil sufficiently drained, and in a light condition favorable for the penetration of the tender rootlets and the absorption of airs and vapors, and gave it a proper amount of humus, would preserve forever the fertility of the land, however large and numerous the crops removed from it. On such a theory as this, modern husbandry in many places seems to be based. But the facts are widely different, and Liebig's peculiar merit, in his writings, is in forcibly exhibiting what had already been demonstrated by Carl Sprengel particularly, that the earthy materials, or mineral substances of the soil, do not act mechanically only, but that, on the contrary, certain mineral substances, fortunately for us, contained in all soils, and, strange as it may appear, in most rocks also, on the surface of the globe, although generally in minute quantities, were just as essential to vegetable growth as the atmospheric elements above mentioned.

These mineral substances, of which we may mention potash, lime, magnesia, phosphates, sulphates, &c., &c., although required in smaller quantities than the atmospheric elements, carbon, hydrogen, oxygen, and nitrogen, are just as essential to the perfection of organic structure as these, and not the smallest microscopic plant or animal, or the minutest cell of tissue could exist without a certain definite quantity of them.

These mineral elements, so called (found in the most fertile soil only in relatively small quantities), are, therefore, continually taken up by growing vegetables, and removed in crops, in quantities greater in proportion to the larger growth. They pass, in their food, into the bodies of animals, and are discharged in their excretions; and thus, when vegetable products or animals fed on them are taken from the land, more or less of these essential elements are alienated from the soil, and it becomes gradually deteriorated, however fine may have been the tilth—however careful the husbandry; until, in the end, the earth refuses to reward the labor spent on it, and is hopelessly sterile.

Ancient as well as modern agriculture, up to a very recent period, has taken little or no account of these facts. It is true that land, when the crops were continually removed from it, was observed to become more and more difficult to cultivate, and less and less able to repay by rich harvests the labor applied to it. Countries which produced and exported grain, tobacco, &c., abundantly, became sterile wastes in Europe, Africa, and even on our new continent: but the real cause of this serious injury was not fully studied or understood. Some virtue of the soil had departed—the land was sick—but no great physician told the impoverished farmer how to restore his exhausted fields. Yet something might have been learned by noting well the fact—that where the land was in the hands of small holders, who exported nothing, but consumed the products of their little farms on the soil which produced them, and thus unwittingly restored to it the mineral elements which had been taken from it by the crops—this exhaustion did not take place in a proportionate degree. In this manner the productiveness of the densely populated land in China is preserved, where the excretions of men and animals are regularly preserved, made articles of commerce, and restored to the soil:—because these excretions, solid and fluid, really contain these mineral elements which had been taken from the land in the vegetable or animal products which constituted their food.

But in countries where a large extent of territory is annually laid under contribution to supply great communities in large cities, and but a small proportion of the excreta is ever carried back again to the soil, most of it being lost in the drains and sewers, this deterioration of the soil is very evident and lamentable. Thus was it that ancient Rome made sterile the Campana and large tracts of fertile land in Sardinia, Sicily, and on the coast of Africa; and thus, in modern times, when railroad and canal facilities cause agricultural products to be carried thousands of miles from the place where

they were grown, the essential elements of the soil are drained at a rapid rate from an enormous extent of country; and by modern improvements in agriculture, which aid in the production of large crops, the deterioration of the soil proceeds more quickly than it has ever done.

Klippart, Corresponding Secretary of the Ohio State Board of Agriculture, &c., &c., laments in his recently published work, "The Wheat Plant," as follows: "Several years ago I became aware of the fact, that wheat, the staple crop of Ohio, was annually diminishing in its yield per acre; that in less than fifty years the average product was reduced from thirty to less than fifteen bushels per acre!"

Numerous other writers, some quoted in the work of Liebig before us, bear the same melancholy testimony even in relation to the land in some of our youngest States—we will not take space at present to copy it.

During the examination of soils from various parts of Kentucky, by the writer, in the prosecution of the Geological Survey of that State, a comparison was made, by minute chemical analyses, between the composition of the virgin soil and that of some of the same locality which had been cultivated for a number of years; and in seventy-one cases out of seventy-nine the soil of the old field showed a marked diminution in the essential mineral elements.

Practical or *empirical* husbandry has been endeavoring, since the commencement of history, to solve the great problem, How to maintain the fertility of the soil in culture. Thousands of experiments in farm operations and manures have been made; and, to a certain extent, this empirical process has been crowned with success. Experience early taught the farmer to rest his fields; to give them a fallow; during which some of the valuable elements locked up in the harder particles of the soil were set free by slow disintegration, and the crop of weeds, by collecting from its depths the scanty nutritive materials, enriched the surface somewhat by their decay, so that larger crops of the useful products could subsequently be obtained. He learned by experience also to send from his farm only the more concentrated and valuable of its products; to raise green crops, with which to feed stock; to cultivate the deep-rooted clover, which would bring to the surface the valuable ingredients of the sub-soil; to carefully preserve all his straw for the litter of his animals, and return to the land all of the fertilizing materials he could thus accumulate as barn-yard manure. But even this, like the fallow system, whilst apparently keeping up the fertility of the soil, gradually and certainly exhausts it, if, after all, the crops of grain, or the animals of the farm or their products are annually exported from it. The land is starved to death in the end by this system, whether crops be carried off from it without the application to it of any manures—or whether abundance of manures, *produced on the farm itself*, is annually applied to it to keep up its surface fertility: the difference being only one of time.

The writer was amused, a short time since, by noticing in the *Cosmos* of the Abbe Moigno, under the uphonious name of *Autophagie*, a new method, proposed to the French Academy of Science, by M. Le Docteur Anselmier, of retarding death by starvation, and of making it less painful; which consisted in opening the veins of the starving individual, and feeding him regularly on his own blood. Just such starvation is the cultivation of soil by means of manures made on the land itself, whilst valuable products, containing a large amount of the essential mineral elements are annually exported from it.

When this system is so far improved as, in Flemish husbandry, to return to the land not only the manure from the barn-yard, but also that from the dwelling-house, the process of deterioration is greatly retarded. But experience has finally taught the farmer, who sells off from his farm his products, the advantage of applying to the soil fertilizing materials from other localities, such as lime, marl, sea-side sand, shells, sea-weed, fish, wood-ashes, plaster of Paris, nitrate of soda, nitre, salts of ammonia, bone-dust or super-phosphates, guano, &c., and by the judicious use of such articles as these, especially of the two latter, aided by improved processes of agriculture, England has, at a great expense, it is true, maintained the fertility of her fields, and even greatly increased her crops within the last fifty or sixty years. But besides the immense amount of bones, Chili saltpetre (nitrate of soda) &c., &c., imported into England for this purpose, we are told (Cosmos, January 13, 1860) that 5000 tons of guano are sold in England per week, at a

medium price of 300 farnes per ton—nearly sixty dollars.

By experiments in the field with these substances, as well as by many others on a smaller scale, by distinguished farmers, chemists, and physiologists, it has been fully demonstrated, that the elements found in the vegetable composition, whether the atmospheric elements or those of a fixed nature belonging to the soil, (although more of some is required than of others), are all equally necessary and essential, and that in the absence of any one of them all the others become useless, and, as it were, paralyzed in their action, until the missing element is supplied. Hence, the apparent great efficiency in some cases, of lime, plaster, bone-dust, ashes, &c., to some soils, and their seeming inertness in others. And, hence, the capability of production of a soil is limited by the quantity of the smallest proportion of any of its essential elements, however rich it may be in the remainder of these important substances.

Common sense has long since appreciated a fact, about the priority of the discovery of which some of the French *savans* have been making their *reclamations* in the *Academie des Sciences*, viz., that the fertility of a soil depends not only on the mere presence in it of the nutritive elements, but also on their being in an available condition. Modern science has been busy within the last fifty years in ascertaining what these essential elements are, and modern husbandry has aided much in showing how they are to be brought to that soluble condition, in which only they are available for the rapid growth of crops. It is found that many substances promote the growth of plants in two ways: First, By giving to them, elements necessary to their composition; and, Second, By acting as solvents to other elements which, without their aid, could not be available for vegetable nourishment. We may particularize water, carbonic acid, salts of ammonia, nitrates, humus, &c., all of which aid in the solution of the earthy phosphates, the carbonates of lime and magnesia, the oxides of iron and manganese, silica, &c. This is one reason why so high a value has been attached to ammonia and its salts as fertilizers, because they not only yield the essential nitrogen, but render the phosphates and other earthy materials soluble in water. But most of the manures which contain ammonia, such as guano, urate, poudrette, &c., also contain the phosphates and other essential materials. Indeed, were the supply of good guano unlimited, and the too great waste of the alkalies of the soil avoided, we need not fear the total exhaustion of the soil; for, at the worst, the profits of agriculture would be the excess of the price of the products of the land over the cost of the guano necessary to their production, added to that of the usual cost of labor and the interest of capital, &c. But the stores of this valuable fertilizer (which is usually deficient in no essential but potash) are becoming rapidly exhausted, and the political economist who is convinced that the ordinary system of agriculture is one of spoliation of the land, must look forward to some other expedient than this to keep up its fertility, on which the very foundations of society are supported.

As no element in nature is ever destroyed, or really lost, it might seem, theoretically, that this might be a very easy matter. The atmospheric elements, carbon, hydrogen, oxygen, and nitrogen are, by known physical laws, constantly present everywhere on the surface of the earth, and need but little care on the part of the agriculturist, except to bring them to their most available condition; but the *fixed elements*—the mineral elements so called—which are carried off from the soil in the crops, are usually accumulated in and around cities, in the vaults and sewers, or drained off in the streams, to be finally lost in the ocean; and immense difficulties surround any effectual project for their restoration to the land. Yet the eye of the philosopher and the teachings of experience show us, that to some plan of this kind must we come in the end if we would avoid starvation; and it remains for practical men fully impressed with this great necessity, to show how it is to be done.

A very great prejudice exists in the public mind, in this country especially, against the use of such fertilizers on the garden or farm; but a little reflection would show that this is unreasonable. It has been in a great measure overcome in many parts of Europe, in some countries of which the contents of the privies are amongst the perquisites of the sovereigns; and in China (we quote from the work before us) "the estimation in which it [human excrement] is held is so great, that everybody knows the amount of excrements voided per man in a day, month,

or year; and a Chinese would regard as a gross breach of manners the departure from his house of a guest who neglects to let him have that advantage to which he deems himself justly entitled in return for his hospitality. The value of the excrements of five people is estimated at two *Teu* per day, which makes 2000 *Cash** per annum, or about twenty hectolitres (440 gallons), at a price of seven florins." The Chinese, accustomed to look on such matters only as objects of commerce and utility, never think of them as nuisances, and take no pains to disinfect them; but in this country any plan which contemplates the restoration to the land of the lost mineral elements by the preservation and use of these excretions, must include some effectual mode of deodorization. Perhaps, by the use of such antiseptics as the simple and cheap one lately employed with much success in the hospitals of Paris, viz: an intimate mixture of two to four per cent. of coal tar with ground plaster of Paris, the prejudice may be overcome, and a regular commencement be made of a system of commerce by which the lands which have been impoverished to feed the cities, shall be renovated by that, to remove which now constitutes one of their greatest embarrassments. This commencement ought to be made before the land becomes so much impoverished that its renovation would cost more than the price of new land at a convenient distance from the city. The ocean has already swallowed up too much of the richness of the soil, on which it has only given us back a scanty interest, in the shape of guano, &c.; but in view of the great popular prejudice in this relation, and the present low price of new land, such a plan is not likely to become general or effectual until a dense population and a scarcity of new land on our broad continent shall oblige the people to study the true philosophy of agriculture.

In forcibly presenting views of this nature to the agriculturists of Europe and of the world, in the little work before us, Liebig has performed the office of a faithful monitor: whether his advice will be regarded remains to be seen. Like most of his writings, this contains, unfortunately, certain crudities and dogmatical statements, which will excite controversy and tend to excite prejudice against it, which will somewhat diminish its utility. We may mention: First, His emphatic assertion, that vegetable food is *not in solution*, when it is absorbed by plants, but that the mineral elements are absorbed, particle by particle, by the rootlets in immediate contact with them in the soil. Now, if this were true, we cannot see the reason why plants cannot grow almost as well during a drought as when the ground is moistened by genial rains. Because, the soil, by its great power of absorption, can remove dissolved phosphates and other materials from water which is filtered through it—is no more a reason why it may not give up some of these absorbed substances to water containing carbonic acid, ammonia, or humus, than the rapid absorption by it of the *heat of the sun* or the *moisture of the atmosphere* should lead us to conclude that heat and moisture could not pass off from it again. We have no space for an argument on this topic; but we *know*, from actual experiment on no less than 375 different soils, treated by prolonged digestion, at the summer temperature, in water containing carbonic acid, that not only did the soil, in every instance, give up notable quantities of its essential elements to solvent, (which is similar in nature to atmospheric water penetrating the soil), but that in some cases, as in virgin prairie soil, rich in humus, and containing but a small proportion of alumina, the quantity of soluble matters extracted by the carbonated water, weighed after it was dried at the boiling heat of water, amounted to nearly 2 per cent. of the soil (1.7 and 1.6 per cent.); whilst in few cases was it as little as the tenth of one per cent. of the weight of the soil. And that the extract contains, it is true, much carbonates of lime and magnesia, but also much phosphates, sulphates, alkalies, silica, organic matters, &c. To assert, then, as Liebig does, positively, in the work in hand, that water does not dissolve out the essential elements of the soil; that the drainage water does not contain any notable quantities of them; that land plants differ from water plants, because they do not take their nourishment in the state of solution, &c., is in our humble opinion, to travel not a little out of the record.

The tendency of this work, like that of all the writings of this author, is to good and towards improvement. It will excite controversy, as they all have done; but the

* 100 Cash are equal to about 4½d.—about eight cents.

collision of ideas, and the experiments instituted with a view to sustain or upset the peculiar views of the controversialists, may end in the establishment of truth in the *theory*, and improvement in the *practice* of agriculture. In this country we have *less* to hope for in this respect than in Europe, in one sense, because new lands are so cheap; but *more*, in another sense, because our farming population is generally more enlightened, and more open to conviction and improvement than the husbandmen of the old countries; but even here a great reform is necessary, and the better education of our youths, who are destined for the profession of agriculture, is loudly called for. It is indeed a great political want, as on the productiveness of the soil intimately depends the prosperity of the nation. At present it is rare to find a farmer who, by his education, is competent to read and understand the works of Liebig and of similar authors on agricultural chemistry—although it is now clearly demonstrable that by the teachings of modern science, aided by enlightened practical experience, must come all real improvements in the theory of agriculture.

Let us hope that States, societies and other communities, will take hold of this energetically, and that the farmer be induced to undergo some other training for his useful profession, besides the ordinary mechanical one.

John Walton's Farm.

"Hadn't you better subscribe for it?"

"I tell you, no. I haint got the money to spare; and if I had, I haint got the time to waste over newspapers," said Eben Sawyer, with some emphasis.

"But you will gain much information from it in the course of a year, sir," pursued John Walton.

"I tell you I don't want it."

"Well, what do you say, Mr. Grummet? Shan't I have your name?"

"No, sir!" This was spoken so flatly and bluntly, that Walton said no more, but folded up the prospectus of a periodical which he had with him, and then turned away.

Eben Sawyer and Ben Grummet were two old farmers—that is, old at the business, though they had only reached the middle age of life; and after their young neighbor had gone, they expressed their opinion concerning him.

"He'll never make a farmer!" said Sawyer, with a shake of the head. "He spends too much time over them papers and books of his'n. He's a leetle mite above farmin', in my opinion."

"Them's my sentiments," responded Grummet. "I tell you, Eben, the man that thinks to make a livin' on a farm in this country, has got to WORK for it."

At this juncture, Sam Bancroft came past. He was another old native of the district.

"We was just talkin' about young Walton," said Sawyer.

"I've just come from there," replied Sam.

"He's been borin' me to sign for a paper; but he couldn't come it!"

"Ha, ha!—so he bored us. He's gettin' a leetle too high for a farmer."

"He's rippin' his barn-floor up!" said Bancroft.

"Rippin' the floor up!" repeated Grummet. "Why, Mr. Amsden had the whole floor put down new only three years ago."

"The stable-floor, I mean," pursued Bancroft. "He's got a carpenter up from the village; and his two hired men are helpin'."

"Whew! I opine he'll make a farmer!"

And so they all opined—with a reservation. In short, there was something highly ridiculous in the thought of a man's thinking to be a farmer and a student at the same time; and all sorts of jests were discharged over it.

John Walton was a young man—some five-and-twenty; and though he had been born in the neighborhood, yet much of his life had been spent in other portions of the country. His parents both died when he was quite young, and his father's farm passed into the hands of a Mr. Amsden. But now John had married, and he meant to be a farmer; and his thoughts naturally turned to the old homestead. He found Amsden willing to sell, and he bought—paying five hundred pounds down, and giving a note and mortgage for five hundred, which had been cashed by Mr. Piddon.

This farming district was upon a broad ridge of land, which had been cleared for a great many years; and though they were the handsomest and smoothest looking farms in the parish, yet they were by no means the best. The summit of the ridge was crown-

ed by a ledge of granite, and the soil, over the whole broad swell, was more or less wet and cold. This was particularly the case with John Walton's farm, some portions of it being wholly unfit for cultivation. There was one field of over twenty acres which was never fit for ploughing. The soil was so wet and heavy that it had never been worked to any advantage; yet there was some good land upon it, and Mr. Amsden had gained fair crops while he lived there.

Ben Grummet had a curiosity to see what was going on in Walton's barn, so he dropped in there. He found that the whole of the floor, where the cattle stood, had been torn up, and that they were digging a wide deep trench, the whole length of the tie-up.

"What is all this for?" asked Ben.

"Why," returned Walton, who was busy in superintending the work, and also in working himself, "I am having a place fixed here for making manure. I mean to fill this trench up with good muck, and thus save the liquids which have heretofore been lost. I think, by proper management, I can get full double the quantity of manure which others have got on this place."

"Do ye?" said Grummet, sarcastically.

"Yes," resumed the young man. "It is a fact that the liquid manures, could they be saved, would fully equal the solids, both in bulk and value; and when combined with well-rotted muck, and some other articles which shall take up and retain all the more volatile parts, I feel sure that they will afford more fertilizing powers and properties than the solid manures can."

"You don't say so! Where d'ye larn all that?"

"Partly from reading, and partly from observation," answered John, smiling at his good neighbor's open sarcasm.

"I don't s'pose it costs anything to do all this?"

"Oh, yes, it will cost me considerable before I get through."

"Yes: I should think 'twould!"

"I say!" he cried, as he met Sawyer shortly afterwards—"John Walton's about as nigh bein' crazy as a man can be!"

"Eh!—crazy, Ben?"

"Oh, he's got his head full of all sorts of nonsense. He's got his stable-floor all torn away, and a trench dug there big enough to hold more'n twenty cart-loads of dirt."

"But what in nature's he goin' to do?"

"Why, he's goin' to save the liquids, as he calls 'em! And he's goin' to put in somethin' to take up the—the—*vol—voluntary* parts."

"*Voluntary* parts! What's them, Ben?"

"It was *vol* somethin'. But I don't know. I wouldn't ask him. I s'pose he just used the outlandish word so's to get me to ask him what it meant—an' then he'd show off his larnin'. But I want so green."

"I wonder if he thinks he's a comin' here to larn us old farmers how to work?" said Sawyer, rather indignantly.

"He thinks so," returned Grummet.

"Then he'll find out his mistake," added the other. "You mark my words, Ben—he'll be flat on his back afore two years is out!"

And these were not the only ones who looked for the same thing. The idea of a man's coming in there with any such new-fangled notions was absurd.

Autumn came, and after John Walton had mowed over his twenty-acre field—some of his coldest and stiffest land—getting hardly hay enough to pay for the labor, he set men at work digging deep trenches all over it. He had two dug lengthwise, running up and down the slope; and then he dug quite a number running across these. They were quite deep and broad, and into them he tumbled nearly all the stones that could be found in the fields.

"A pooty expensive way of gettin' rid o' rocks," remarked Grummet.

"It's a better place for them than on the surface, isn't it?" returned Walton, with a smile.

"Perhaps. But what on earth are ye doin' it for?"

"Why, I'm going to see if under-draining won't improve the land."

"*Under-draining!* What's that?"

"It is simply drawing off the water from the surface. This land is cold and wet; but if I can get the water to drain off among these rocks, the sun may warm the surface, and give me a good piece of soil here."

But it looked very foolish to Ben Grummet. He believed that "what was the natur of the soil couldn't be altered."

"That's a cur'us contrivance," said Sam Bancroft. He and Ben Grummet had been at work for Walton at hauling muck. He alluded to a large vat at the back of the house, into which ran a spout from the sink. This vat was capable of holding several

cart-loads of stuff, and was already half full.

"That's a compost vat," explained Walton, who had overheard the remark. "All the slops from the house, the soap-suds, and such stuff, which most people waste, I save by this means, and turn to good account; and instead of throwing away refuse matter, I put it in here, and let it rot and ferment, and make manure."

"But what's this charcoal dust for?"

"It answers two purposes, though by only one office. It takes up the ammonia and other volatile matter, thus holding them for fertilizing agents, and at the same time prevents the disagreeable effluvia which would otherwise arise from such a fermenting mass."

"That all sounds very well," remarked Ben, after Walton had left them; "but, let me tell you, *it don't pay!* He'd better let such fandangles alone, if he ever expects to make a livin' at farmin'."

Before the ground froze up, Walton threw out most of the muck behind his stable, which had become well saturated, and filled the trench up anew.

The old farmers had a great many apple trees, and made a great deal of cider; but the fruit was of an inferior quality. When spring came, Walton went to some of his neighbors, and asked them to go in with him, and send for some good scions to engraft upon their apple trees. He explained to them just the plan he had formed for his own orchard. He had engaged a competent man to come and do the work of grafting, and, while they were about it, it would be cheaper to get grafts enough for the whole neighborhood.

It was of no use. The old orchards were just such as their fathers had, and they were good enough. So Walton went at it alone. He had his trees all pruned and dressed, and nearly all of them grafted to such fruit as he thought would thrive best and sell best.

A little while later, and Ben Grummet had occasion to open his eyes. He found that John Walton had contrived to have a hundred and forty full loads of manure, all of which had been made within the year. However, he finally shook his head, and said, "Wait. We'll see if it's good for anything."

A little while later, and the grass began to spring up on the twenty-acre lot as it had never sprung up before. The two acres, which had been ploughed, and harrowed up light and fine, bore the best crop of corn that was grown in the whole county, and all the manure put upon it was some which had been manufactured.

And so the time went on, and John Walton was continually studying how to improve his farm. At the expiration of a few years the new scions had grown large and strong in his orchard, and began to bear fruit. He had taken care of his trees, and they were about ready to return him interest for the labor.

"Good gracious!" ejaculated Eben Sawyer, as Ben Grummet and Sam Bancroft came into his house one cool autumn evening, and the three filled their mugs with new cider: "have you heard about John Walton's apples?"

"I knew there was a man up to look at 'em," returned Ben; "but I ain't heard no more."

"Well, I was there, and heerd the whole on't,—so I know,—I never would 'ave thought it. An orchard turn out like that!"

"But how much was it?"

"Why, Walton was offered—cash right down—a hundred pounds for the apples he's got on hand, and he tells me that he sent nearly fifty pounds' worth of early fruit off a month or more ago."

It was wonderful—more than wonderful! But they had to believe it.

"And look at that twenty-acre field," said Bancroft. "Ten years ago it wouldn't hardly pay for mowin'; now look at it. Think o' the corn and wheat he's gained there; and this year he cut more'n forty tons of good hay from it!"

"But that ain't half," interposed Sawyer. "Look at the stock he keeps; and see what prices he gets for his cows and oxen. Why he tells me he's cleared over four hundred pounds this year on his stock."

At this moment Mr. Walton came in. He had grown older, and was somewhat stouter than when he first became a farmer, and his neighbors had ceased to question his capacity, and had come to honor and respect him.

"We was talkin' about you, Mr. Walton," said Sawyer.

"Ah!" returned John, as he took a seat by the fire. "I hope you found nothing bad to say of me?"

"Not a bit of it. We was talkin' about the wonderful improvements you've made on the old place, and of the money you make."

"And do you think it wonderful?"

"But ain't it?"

"Well," replied Walton, "I don't know about that; but I'll tell you what I do know. I know there is no class of people in the world who may study the arts and sciences to better advantage than farmers; and yet, I am sorry to say, there is no class, as a class, occupying the same social position, who read and study less; of course there are many honorable exceptions. Farming is a science—one of the most deep and intricate—and he must be a man of more than ordinary capacity who can master it all. But farmers must not be afraid of books; they won't, if they are wise, follow every advice which experimentalists give; but they may study, and reason, and experiment for themselves. So I have done, and so I mean to do."

"He's right!" remarked Ben Grummet, after Walton had gone. "What fools we was that we didn't go into that graftin' operation!"

"And that under-drainin'," added Bancroft.

"And that muck and compost arrangement," suggested Sawyer.

"Well," said Ben, with a serious face: "it isn't too late now. They say, it's never too late to learn; and I'm sure it hadn't ought to be too late to commence to improve after a body has learned."

"True as a book!" added Bancroft.

"Good evening!"

"Good evening!"

[*New York Observer.*

Sheep-Shearing in Pennsylvania.

The annual public shearing of the flock of pure bred Merino Sheep of General John S. Goe, was held at his residence, 4½ miles east of Brownsville, Fayette county, Pennsylvania, on Thursday the 31st of May, in the presence of a large number of wool-growers and other citizens. The meeting organized by electing George E. Hogg President, and H. W. Goddis and Jacob Woolf Secretaries.

The President appointed Levy Colvin, John Hess, James Ewing, Major Clarke Brading, Isaac Wiggins, John Conwell, Clarke McDugal, William Colvin, David Dayermond, and James Higginbotham, a committee to superintend the shearing and weighing of the fleeces, and also to examine his stock of horses and cattle.

The committee, in fulfillment of their commission, reported to the meeting: "That they had examined General Goe's flock of Spanish Marino Sheep, and were of the opinion, that they could not be surpassed, if equalled, in Western Pennsylvania. Below will be found the weight of the fleeces of a part of his flock: Of Ewes, 29 fleeces were washed and weighed, ranging from 5 lbs. to 7 lbs. 12 ozs., and averaging 6 lbs. 3 ozs.; and of Ewes, unwashed, 44 fleeces were weighed, ranging from 7 lbs. to 10 lbs. 13 ozs., averaging 8 lbs. 7½ ozs.

"The unwashed fleeces of three Rams were tested and weighed, respectively 13 lbs. 5 ozs., 12 lbs. 6 ozs., and 13 lbs. 3 ozs., their ages being one year old or less."

The committee further reported, "That General Goe's stock of Horses is very fine, and has been selected and bred with great care, and consists of the celebrated horse 'Rush Messenger,' and Messenger, Mambrino, Bashaw, Morgan and Blackhawk, mares and colts.

"His short horn Durham cattle are all thoroughbred, (among which is his Bull Conqueror,) and worthy the attention of stock raisers."

In short: "Your committee are unanimously of the opinion that General Goe is entitled to the thanks of the community for his great exertions in procuring and breeding the very valuable assortment of stock which he now has on his farm." * * *

A Wife's Influence on her Husband's Fortune.

A woman has her husband's fortune in her power, because she may, or may not, as she pleases, conform to his circumstances. This is her first duty, and it ought to be her pride. No passion for luxury or display ought, for a moment, to tempt her to deviate in the least degree from this line of conduct. She will find her responsibility in it. Any other course is wretchedness itself, and inevitably leads to ruin. Nothing can be more miserable than the struggle to keep up appearance. If it could succeed, as it never can, it would cost more than it is worth; its failure involves the deepest mortification. Some of the sublimest exhibitions of human virtue have been precipitated suddenly from wealth and splendor to absolute want.

Then a man's fortunes are, in a manner, in the hands of his wife, inasmuch as his own power of exertions depends on her. His moral strength is inconceivably increased by her sympathy, her counsel, her aid. She can aid him immensely by relieving him of every care which she is capable of taking upon herself. His own employments are usually such as to require his whole mind. A good wife will never suffer her husband's attention to be distracted by details, to which her own talents are adequate. If she be prompted by true affection and good sense, she will perceive when his spirits are borne down and overwhelmed. She, of all human beings, can best minister to its needs; for the sick soul, her nursing is quite as sovereign, as it is for corporeal ills. If it be weary, in her assiduity it finds repose and refreshment. If it be harrassed, and worn to a morbid irritability, her gentle tones steal over it with a soothing more potent than the most exquisite music. If every enterprise be dead, and hope itself almost extinguished, her patience and fortitude have the power to kindle them in the heart, and he again goes forth to renew the encounter with the toils and troubles of life.

Lynchburg Republican.

The Steam Press.

In the course of his eloquent address at the Tract Meeting, Dr. Fuller said: "Who can measure the power of the press? An ounce of lead moulded into a bullet, and put into a Minie rifle, with a few grains of powder beneath it, will do its errand sufficiently upon a man two miles distant, if it encounter no obstacle; but that ounce of lead made into types and put into one of Hoe's lightning printing-presses, will go thousands of miles, and do its errand effectively, not on one man merely, but on millions, and that, though oceans, rivers and mountains may intervene. A steam printing-press! Did you ever go down into one of the spacious vaults beneath your side-walks, and watch the monsters? I feel something like awe in looking at them. I feel like taking off my hat to the huge machine. It seems to me like one of Ezekiel's living creatures, with the hand of a man, and the sound of many waters, and the spirit of the living creature in the wheels.

"It asks no nourishment, knows no weariness. How it strips itself to its work, and toils on with a strength that mocks to scorn the might of the giant, and with a clamor as if it would shiver to pieces every substance in its grasp. And yet, with a delicacy and precision unattainable by human muscles, it receives a fabric so delicate that a rude touch would rend it, and imprints upon it, in a twinkling of an eye, that which cost hours to compose. It flings off sheets to entertain, instruct, regenerate, and bless the earth. None of us have yet begun to appreciate the influence of the press as an agent for the diffusion of knowledge, whether it be in volumes, pamphlets, or above all, through the daily newspaper, that moral institution which has revolutionized not only the literary but the commercial and political world. It would be an unheard of delinquency, did not the Church of God employ this mighty agency.

New York Chronivle.

Grape Culture.

[We extract from the Whig the subjoined article to which we invite the attention of our readers.

The cultivation of the grape is attracting increased attention in almost every part of our country, and appears likely to become an important branch of the industrial pursuits of our rural population. But, let those who entertain the idea of embarking in the business extensively, be careful to inform themselves of the peculiarities of climate, soil, elevation and exposure which are necessary prerequisites for the successful cultivation of the vine.

"We know," says Lieut. Maury, "how powerfully the presence of abundant moisture in the atmosphere affects the flavour of our delicate fruits: at certain stages of the crop, a few days of rainy weather will destroy the flavor of the strawberry, the peach, &c.; and we know that the grape requires sunshine and dry air to perfect its secretions.

"The finest grapes in the world are grown in the valley of the Caspian Sea, where Humboldt tells us the air is so pure that the most finely polished steel may be exposed in the open air for days and days without having its lustre tarnished. This is but another expression for a dew-pint, or a dry atmosphere. There the evaporation and precipitation as in our own valley of the great Salt Lake, are exactly equal.

"Though there may be here and there under the mountains of Georgia, the Carolinas, Virginia, Tennessee, &c., small districts adapted to the production of wine these charts (alluding to his charts of the winds and currents of the sea) indicate that there is on this continent a large district, the climate—for I know nothing of soils—of which is admirably adapted to the culture of the grape. That climate is in North-Western Texas and the regions thereabout."]

"A report has recently been made by Mr. Erskine, the British Secretary of Legation at Washington, to the proper office in Lon-

don, respecting the capacity of this country to produce wine. Mr. Erskine has collected some valuable statistics and reliable information on this subject since his sojourn in this country, which he has transmitted to the Foreign Office, and which have been published in the English journal.

For this report, says the New Orleans Crescent, it appears that wines were made in this country, in the territory which now comprises the States of Indiana and Missouri, as long ago as the latter part of the last century. It was a cheap red wine, palatable to the taste, but not enough so to supersede the wines of France and Germany. It was only about the year 1830 that the Catawba, a native American grape, first came into notice, and began to be used and cultivated regularly for the making of native wine. The Catawba was found growing wild near Washington City, resembling the fox grape somewhat, and producing a wine which, though disagreeable at first, gradually grows upon the taste, until it is preferred by those who habitually use it to the best brands of foreign importation.

The climate best adapted to the growth of the Catawba grape is the dry climate west of the Alleghanies, removed from the moisture of the sea coast. In the neighborhood of Cincinnati, and all along the parallel of latitude through Indiana, Illinois and Wisconsin, the Catawba grape flourishes, and is easily produced. It is generally believed that Nich Longworth, the great wine-king of Cincinnati, monopolises the culture of the Catawba grape in that region, but this is a mistake. On all the hills surrounding Cincinnati, both on the Kentucky and the Ohio sides wherever there is a Southern exposure, may be found vineyards belonging to industrious Germans and Swiss, who understand the culture of the grape and the manufacture of wine, and who derive a good profit from their labor in this branch of industry.

"But it is not alone in the neighborhood of Cincinnati that the Catawba is cultivated. Besides the three thousand acres that are under cultivation there, it is estimated that there are thousands of acres devoted to this purpose in Indiana, in Missouri and Illinois, and in Georgia and the two Carolinas. This refers only to those places in which the Catawba grape is regularly raised as a crop. Of course there are also thousands of acres in the different States appropriated to the culture of the grape and the manufacture of native wine, by people who use it only for domestic consumption, and never enter the market to sell it. The total production of wine at the present time is estimated to be two millions of gallons annually—and the amount is increasing every year. The census which is to be taken the present year will show, we doubt not, a greater comparative increase in the product of this particular branch of industry, within the last decade, than any other in the country.

The State of Missouri alone has an area suitable for grape culture larger than the wine-growing districts of France. In Kentucky and Tennessee, in Middle and Western Virginia, in Western Texas, and in California, the vine grows in great perfection, producing an abundance of good palatable wine. In short, there is scarcely any section of the Union below the fortieth parallel of latitude in which domestic wine may not be made, and sold at a profit, by people who understand the culture.

"The Catawba wine is made and sold in Cincinnati and St. Louis by wholesale at about one dollar a bottle. There are many who prefer it to genuine champagne. Everybody prefers it to the imitation bogus champagne which is manufactured in New York. But there are other grapes besides the Catawba to which our climate and soil are adapted, and we see no reason why we may not produce within our own limits almost every variety of wine that the popular taste may demand. The Germans in Western Texas, we understand, are making a red wine, much resembling clarat, and very palatable. We may at least manufacture all the varieties of red and white wines that are made in Europe, depending upon importation for our Ports and Madeiras alone.

"The people of this country pay a higher price for wines than any other people on earth, because there is a heavy duty on them in addition to the original cost and the cost of importation. If we made our wines at home, as we easily can, we would not only get them cheaper, but have a guarantee of their genuineness. Besides this, every body knows that in countries where wine is plentiful and cheap there is less consumption of those strong, fiery liquors, manufactured out of all sorts of poisonous drugs, which are the fruitful causes of so much crime and distress. It is therefore in the interest of mortality as well as economy and comfort,

that we should encourage the production of native wine. Certainly, a land so blessed as ours is, with every variety of soil and climate, and of so magnificent extent, need not long depend upon foreign countries for our supply of wines—and it would not surprise us if, before the end of the present century, we not only made all that is necessary for our own consumption, but—reversing the current of trade—became exporters of the article instead of importers."

For the Southern Planter.

Drilled and Broadcast Seeding Compared.

The advantages of drilled over broadcast sown wheat have been so often discussed, and enjoined upon us small farmers, that it seems scarcely possible to present anything new in relation to the subject. Even manufacturers, in their advertisements, urge upon us the great importance of using a machine instead of adhering with obstinate pertinacity to the primitive custom of scattering indiscriminately with the hand. From whatever source such admonitions may proceed, whether those who offer them are actuated by the noble incentive of doing good, or prompted by the desire of making money, we should receive them thankfully if calculated to render us any service. The depositing of grain in drills I consider to be a step towards agricultural improvement as far in advance as any which has been taken in modern times by innovation upon antiquated practices. Perhaps I ascribe too much importance to the mere mechanical deposition of the seed; but trifling as such an operation may appear, I conceive it to be, and will endeavor to show, that it is, a matter of no little moment. I know that some persons are wont to regard with indifference the particular mode of operation which may be pursued. "So the seed are put in the ground," say they, "no matter how—why, what difference does it make?" But, lightly as *they* may esteem the difference, it is, nevertheless, material. Both the regularity with which the seed are distributed, and the important saving which is effected in their use, are, obviously, considerations of themselves, irrespective of all others, sufficient to induce the adoption of the drill. But, besides these, there are other reasons in its favor which I consider deserving of consideration.

The first indication by which the farmer forms an opionion of his future crop, after the seed are planted or sown, is to be able to determine whether or not he has a "good stand." He is anxious to know what proportion of the seed sown has taken root and "come up." In planted crops he can satisfy himself without much difficulty, but in sown crops he can only form a vague conjecture. A *certainty* in regard to the latter is the great desideratum. That method then which is most favorable to the uniform and cotemporaneous germination of all the seed sown, is the one that should be adopted by every farmer who has his own interest at heart. When we sow five pecks of seed upon an acre of ground, we want every grain to take root and spring up.

When seed are arranged in drills they are *all* covered at a uniform depth beneath the surface; when scattered, and afterwards harrowed or plowed in, some are buried too deep, a portion not deep enough, and others not at all. The former method not only insures the simultaneous germination of the seed, but a certainty that a good stand can be thereby effected. Just the reverse is true with respect to the latter; the seed being buried at different depths, spring up irregularly and at different times, while those that are not sufficiently covered with earth will either not spring up, or, if they do, will produce sickly and imperfect plants. We have only to consider the atmospheric changes constantly taking place at the surface of the earth, and within a given depth of soil, in order to be convinced of the preeminence of drilled over sown seed. The effects of these changes upon the germination of seed vary with their depth beneath the surface. There is a certain depth to deposit the seed that possesses every requirement to perfect a speedy and healthy germination. The evaporation which is constantly going on at the surface of the earth, through solar influences, combined with the effects of the winds, causes a thin stratum of soil immediately at the surface to be almost totally destitute of moisture, while the humidity of the substratum is constantly ascending, in obedience to the law of capillary attraction to restore that which is removed from above, thus maintaining in *genial* condition—the requisite degrees of temperature and dampness—at the proper depth, while it replaces the watery vapour exhaled, and is in its turn evaporated from the surface. If we descend a little further

into the stratum which immediately underlies this more genial layer, we reach one that is comparatively cold and repulsive. Now, if these three layers, which exist in all ordinary soils, do really possess the peculiarities attributed to them, then will they serve as data upon which to institute a correct comparison of the relative merits of the two modes of seeding, and enable us to arrive at an incontestable conclusion.

First. Let us consider to what extent this top stratum is adapted to promote germination.

If heat and moisture are as absolutely necessary to the germination of the seed, as light and air are indispensable to the growth and development of the plant after germination, the disturbance of the relative proportions of these two elements by the undue predominance of heat, and the consequent displacement of moisture from near the surface, plainly demonstrates the necessity of descending to a lower depth of soil, to secure such a modification of the degree of heat as will admit the presence of the requisite amount of moisture without, at the same time excluding the necessary action of light and air in the work of development after the germination of the seed and the springing up of the plant. Too near the surface the seed will not only fail to germinate, but by exposure under such unfavorable circumstances will generally lose their vitality. True, the seasonable and abundant fall of rain may so restore the equilibrium of these forces as sometimes to promote the early germination of seed even under the most unfavorable depth of covering, but in the absence of continued rains, the absorption of heat and the evaporation of moisture proceed; the conditions favorable to the deep radication in the soil, and growth of the young plant are removed; its healthful development is at once arrested; and it is destined to a sickly existence, or to wilt and die under the withering influence of solar heat.

Although not the next in order, we will in the second place attempt to show in what manner the third layer influences germination. At this depth of soil it is not often prevented, but is only retarded. Moisture exists, it may be, in abundance, but it is so far removed from the surface that the temperature of the soil is too low to supply the most favorable conditions of germination. The seed are not only slow in sprouting, but the young shoot having to struggle up through such a mass of overlying soil, its appearance at the surface is long delayed, and it has for a length of time to forego the advantages of light, heat and air, so necessary to the development and early maturity of the plant, when once firmly rooted in the soil. We say *early maturity of the plant*, because we wish distinctly to particularize the want of THAT as one of the greatest evils of deep seeding. In proof of this we have only to cite a single case—an extreme one we admit—but possessing similar conditions, it will serve the purpose of a striking illustration of the truth of the objection to deep covering on account of its influence on the tardy coming up and late ripening of the crop. There are few who have not had occasion to mark the interval of time ensuing between the first and last coming up of *sown* small grain on cold, sour land. My oat crop, this year, was sown on cold, craw-fish land. The interval that elapsed between the first and last coming up of the seed was of such duration that I despaired of obtaining anything like a stand, and scolded the overseer for sowing them too thin. Walking over the field sometime after I was surprised to find the ground literally covered with plants. Those seed that came up last comprised by far the greater portion of those sown, and the consequence was, when I came to harvest the crop, the smaller portion was dead ripe, while the balance was only in the milk state.

We come now, thirdly, to the layer intervening between the two already described. This stratum, by its proximity to the heated surface above, and the cool damp layer underlying it, fulfills every condition towards the perfect and speedy germination of the seed, the vigorous maintenance of the young plant, and the maximum yield of the crop. The excess of moisture from beneath, and the overdose of heat above are happily counter-balanced—the two extremes harmonized. Thus furnishing to the intermediate layer, exactly in the proper proportions, every attribute that characterizes a genial soil. In this layer, then, it is evident it should be the aim of every farmer to deposit his seed. The Drill will enable him to accomplish the object. I trust I have not clothed the subject with undue importance, but that he who adopts it will have just occasion to unite with me in recommending it for the great benefits attending its use.

In connection with this subject, permit me, before I conclude, to say a few words in relation to the objections frequently urged by us small farmers against the purchase of labor-saving implements. The most of us are staggered at the bare mention of investing a hundred dollars or so in the purchase of a machine; and rather than thus dispose of so much of our hard earned savings, we are content to plod along in the same old sluggish, slovenly track of our "illustrious ancestors." The wonder is, that those of us who entertain such narrow-minded notions do not still hitch our plows to the horse's tail for the sake of saving the expense incurred in furnishing him with gear. It never seems to enter the brain of some of us that by spending money, especially in procuring machines, we might possibly make money. A thought propelled upon the swift wings of an electric flash could not beat a conviction to this effect into such microscopic brains. Although many of us possess land peculiarly adapted to the use of the Drill, and seed every year of our lives in small grain, an area extensive enough to justify its use, yet, rather than extract from the corners of our old "chists" a hundred dollars of *idle* money to expend in the purchase of a useful machine, which would repay us with double compound interest for the investment, we seem to rest satisfied with a practice that incurs an annual loss by the want, more than equal in amount to the cost of the best machines. Until we can be divested of such narrow-minded notions, and follow up the improvements which agriculture, as an art, is constantly developing, and is still profitably susceptible of, we may always expect to be singing that same old monotonous song of "hard times."

"CHUCKATUCK."

Meteorology.

Dew and hoar frost.—When a mass of moist air is brought in contact with a cold body, its vapor is condensed into water and deposited in minute globules on the cooled surface, which constitute dew. If the temperature of the surface is below the freezing point, the globules of water will be frozen into minute crystals of ice, which constitute hoar frost. For a long time the nature of these phenomena was entirely misconceived; the effect was put for the cause, the dew being regarded as producing the chill which accompanies its formation, instead of the reverse. Dr. Wells, of London, born in South Carolina, was the first who gave the subject a scientific investigation, and, by a series of ingenious, accurate, and conclusive experiments, furnished a definite explanation of all the phenomena. They are simply due to the cold produced in different bodies by radiation. As we have seen in our essays in previous Reports of the Patent Office, the earth is constantly radiating heat into celestial space, and is constantly receiving it from the sun during the continuance of that body above the horizon. As long as the heat from the sun exceeds that radiated into space, the temperature of the surface of the earth and that of the air in contact with it continues to increase; but when the two are equal, the temperature remains stationary for a short time, and then begins to decline as the heat of the sun, on account of the obliquity of the rays, becomes less than the radiation into space. The maximum of heat generally takes place between 2 and 3 o'clock in the afternoon, and the cooling from this point goes on until near sunrise of the next morning. As soon as the sun descends below the horizon, the cooling of the surface of the earth takes place more rapidly if the sky be clear, the air in contact with grass and other substances which are cooled by this radiation, will deposit its moisture in a manner analogous to that of the deposition of water on a surface of a metallic vessel containing a cold liquid. Although the atmosphere may contain the same amount of vapor, yet the quantity of dew deposited during different nights, in different places, and on different substances, is very different. It is evident that, all things being equal, it must depend upon the quantity of moisture, since if the air were dry no deposition could take place; and, indeed, it has been remarked that on some parts of the plains west of the Mississippi dew is never observed. It must also depend upon the clearness of the sky; for, if the heavens be covered with a cloud the radiant heat from the earth will not pass off into celestial space, but will be partly absorbed by the cloud and radiated back to the earth. This is not a mere hypothesis, but has been proved by direct experiment. The author of this article, while at Princeton, some years ago, placed a thermo-electric apparatus in the bottom of a tube provided with a conical reflector, and

thus formed, if the expression may be allowed, a thermal telescope, with which the heat of a cloud of the apparent size of the moon was readily perceptible. When this instrument was directed first to the clear sky in the vicinity of a cloud, and then immediately after to the cloud itself, the needle of the galvanometer attached to the thermo-electric pile in the tube always deviated several degrees. At first sight it might appear, from this experiment, that the heat of the cloud was greater than that of the transparent air in which it was floating, but this was not necessarily the case; the rays of heat from the apparatus, when it was directed into the clear sky, passed off into celestial space, while, when the instrument was directed to the cloud, they were absorbed and radiated back. It is probable, however, that the lower surface of the cloud is really a little warmer than the air in which it is floating from the radiation of heat by the earth, while the upper surface is probably colder on account of the uncompensated radiation into space. But, be this as it may, the counter radiation of the clouds prevents the cooling down of the bodies at the surface of the earth sufficient for the deposition of dew, or at least to allow of the formation of a copious quantity. A haziness of the atmosphere, and it is probable a large amount of invisible vapor will retard the radiation, and hence a still, cloudless night, without a deposition of dew is considered a sign of rain. The amount of deposition of dew will also depend upon the stillness of the atmosphere; for, if a brisk wind be blowing at the time, the different strata of air will be mingled together, and that which rests upon the surface of the ground will be so quickly displaced as not to have time to cool down sufficiently to produce the deposition.

Again, the deposition will be more copious on bodies the surfaces of which are most cooled by the radiation. It is well known that different substances have different radiating powers. The following table from Becquerel exhibits the proportional tendency of different substances to promote the deposition of dew. The figures do not represent the relative emissive power, but the combined effects of emission and conduction:

1. Lamp black, - -	100
2. Grasses, - - -	103
3. Silicious sand, - -	103
4. Leaves of the elm and the poplar,	101
5. Poplar sawdust, - -	99
6. Varnish, - - -	97
7. Glass, - - -	93
8. Vegetable earth, - -	92

Polished metals are, of all substances, the worst radiators; they reflect the rays of heat as they do those of light, and it would appear that by internal reflection the escape of heat is prevented from the capacity of the metal. In order that the surface of a body should cool down to the lowest degree, it is necessary that it should be a good radiator and a bad conductor, particularly if it be in a large mass and uninsulated. Thus a surface of a mass of metal coated with lamp black, though it radiates heat freely, will not be as much cooled under a clear sky as a surface of glass, since the heat lost at the surface is almost immediately supplied by conduction from within. If, however, a very small quantity of metal, such as gold leaf, be suspended by fine threads, the dew will be deposited, because the heat which is radiated is not supplied by conduction from any other source, and hence the temperature will sink to a low degree.

M. Melloni has, within a few years past, repeated the experiment of Wells, established the correctness of his conclusions, and added some particulars of interest. He found that the apparent temperature of the grass, which in some cases was 8° to 10° lower than that of the air at the height of 3 to 4 feet, was not entirely due to the actual cooling of the air to that degree, but to the radiation and cooling of the thermometer itself, the glass bulb of which is a powerful radiator. To obviate this source of error in estimating the temperature he placed the bulbs of his thermometer in a small conical envelope of polished metal of about the size of an ordinary sewing thimble. This prevented a radiation, and, by contact with the air, indicated its true temperature. He found, with thermometers thus guarded, that the solid body was in no case cooled down more than 2° below the temperature of the surrounding air, and that the amount of radiation was nearly the same at all temperatures. The explanation, therefore, of the great cold of the air between the blades of grass is as follows: By the radiation of the heat, the grass is at first cooled two degrees lower than the air at the surface of the earth, and next the thin stratum of air

which immediately surrounds the grass is cooled by contact to the same degree. It then sinks down and another portion of air comes in contact with the blade of grass, and is in its turn cooled to the same extent, and so on until all the air between the blades is two degrees lower than that of the air farther up. The radiation, however, continues, and a stratum of air from the mass already cooled two degrees more, which sinks down as before, and so on until the air between the blades is cooled to 4° below its normal condition; and in this way the process may be continued until the temperature descends to 8° or 10° below that of the stratum of air a few feet above. In this way we can readily explain the small amount of dew deposited on the tops of trees, since the air, as soon as it is cooled, sinks down toward the ground, and its place is continuously supplied by new portions of the atmosphere. To the same cause, we may attribute copious deposition of dew on wool and other fibrous materials which, though they do not radiate heat more freely into space, they entangle and retain the air between their fibres, and thus allow the cooling process we have described to go on. It would appear that spider-webs radiate heat freely into space, since they are generally covered with a large amount of dew; their insulated position prevents them from renewing their heat, but, according to the above principle, a much larger amount of deposition ought to be produced by the same material, were it loosely gathered up into a fibrous mass. The fact of the screening influence of the clouds teaches us that a thin cloth, or even a slight gauze, supported horizontally over tender plants, is sufficient to neutralize the radiation, and to prevent injury from frost during the clear nights of spring or autumn. The same effect is produced by artificial clouds of smoke.

Since radiation from the surface of the earth is most intense on clear nights, when the moon is visible, many of the effects which are due to this cause, have been referred to lunar influence; for example, a piece of fresh meat exposed to the moonlight, is said to become tainted in a few hours; this may arise from the deposition of moisture on the surface of the meat due to the cooling from radiation. The moon itself, however, acts as a cloud and radiates back to the earth a portion of the heat which it received from the earth, as well as a portion of that which it received from the sun; and hence Sir John Herschel has referred to this cause, with apparent probability, the origin of an assertion of the sailors, that "the moon eats up the clouds." He supposes that they may be dissipated by the radiant heat from that body, which, being of low intensity and but feebly penetrating the lower stratum of the atmosphere, may serve to dissipate the clouds. Though a wrong explanation is generally given by the popular observer of natural phenomena, and though effects and causes are frequently made to change places in his explanations, yet it is true, as Biot has properly said, that the scientist who devotes himself assiduously to investigate the subject of popular errors, will find in them a sufficient amount of truth to fully repay him for his labour.

Formation of Fogs.—The difference between a fog and a cloud relates principally to the conditions under which they are severally formed. A fog has been aptly called a cloud resting on the earth, and a cloud a fog suspended in the atmosphere. The circumstances under which a fog is usually produced are the following: Either the surface of the earth or water is warmer than the air, or it is cooler. If the temperature of a river or of a damp portion of ground is higher than that of the atmosphere which rests upon it, the warmer surface will give off vapour of an elastic force due to its temperature. Should the superincumbent air be extremely dry, the vapour will diffuse itself up through it in an invisible form, without condensation, and no fog will be formed until, by the continuation of the process the air becomes completely saturated; and then if an excess of heat remain in the evaporating surface, the fog will be produced, and will increase in density and height so long as a difference of temperature continues. If, however, a wind be blowing at the time, so that successive portions of unsaturated air are brought over the place, no fog will be produced. A still atmosphere, therefore, is a necessary condition to the accumulation of fog.

The foregoing is the usual method in which fog is produced, for it is well known that in cold weather the surfaces of lakes and rivers are much warmer than the strata of air which rest upon them.

It is, however, frequently observed that fogs are formed during still nights, in low places, when the surface of the ground is colder than the stratum of the atmosphere whice rests upon it, and, indeed, we have shown that the temperature of the surface of the earth on a still and clear night is always lower than that of the air which is immediately in contact with it; and it is not easy, without further explanation, to see the reason why fogs should not always be produced in this case as well as dew. When the atmosphere is still, the condensation of the vapour by the coldness of the surface is so gradual that the air is not disturbed, and the strata immediately above the grass has relatively less moisture in it than that a few yards higher; hence, no fog ought to be produced in this case, since all the precipitation produced is that which has settled directly upon the grass in the form of dew. In this case we may define the dew to be a fog entirely condensed into drops of water. The question still arises, how, under these conditions, can a fog really be produced? The answer is, that another condition is required, namely, that the surface, cooled by radiation, should slope to a lower level, as in the side of a hill or the concave surface of the sides of a hollow. In this case the superincumbent stratum of air of which the temperature has been lowered by contact with the cold earth, flows down the declivity, by its greater weight, into the valley below, and there, mingling with the damp air which generally exists in such places, precipitates a part of its transparent vapour into visible fog. In the way we have described, large hollows are sometimes seen in the morning, filled with a mass of fog, exhibiting a definite and level surface, presenting the appearance of a lake of which the shores are bounded by the surrounding eminences; and if a depression of sufficient depth occurs in any part of the circumference of the basin, through this the fog is seen to flow like a river from the outlet of a lake.

The explanation we have here given of the formation of fog in low places is also applicable to the phenomenon, frequently observed, of early frost in the same localities. As rapidly as the air is cooled on the sides of sloping ground it sinks into the valley below, and its place is supplied by the warmer air above, which has not been subjected to the cooling influence. In the vicinity of Washington, the hollows are sometimes found several degrees colder than the more elevated parts of the surrounding surface. Fogs are produced on the ocean when a little wind, charged with moisture, mingles with another of a lower temperature. The wind from the Gulf Stream mixing with the cold air which rests upon the water from the arctic regions, which, as we have before stated, flows along close to the eastern shores of our Continent, gives rise to the prevalence of fog over the Banks of Newfoundland.

There is another atmospherical phenomenon which, though it does not affect the hygrometer, and is only indirectly connected with moisture, is generally classed with fogs. I allude to what is called dry fog—a smoky haziness of the atmosphere, which frequently extends over a large portion of the earth. The nature of these fogs is now pretty well understood, and more refined observations, particularly with the microscope, have served to dissipate the mystery in which they were formerly enshrouded. When a portion of the air in which the fog exists is filtered, as it were, through water, and the substance which is retained is examined with the microscope, it is found to consist of minute fragments, in some cases, of burnt plants, and in others of the ashes of volcanoes. It is surprising to what a distance the pollen of plants and minute fragments of charred leaves may be carried. Samples of substances which have been collected from rain water and examined microscopically by Professor Schaeffer, of Washington, at the request of the Smithsonian Institution, have been found to consist of portions of plants which must have come from a great distance, since the species to which they belong are not found in abundance in the localities at which the specimens were obtained. It is highly probable that a portion of the smoke or fog-cloud produced by the burning of one of our Western prairies is carried entirely across the eastern portion of the Continent to the ocean. On this subject, Dr. Smallwood communicated a series of interesting observations to the American Association at their meeting in Albany, in 1855. Particles of matter of the kind we have described are good absorbers and radiators of heat, and hence in the daytime they must become warmer than the surrounding atmosphere, and tend to be buoyed up by the ex-

pansion of the air which exists in the interstices between them, while at night they become cooler by radiation than the surrounding air, and tend to condense upon themselves the neighboring moisture, and consequently to sink to a lower level. It is on this account that the smoky clouds which are produced by the enterprising manufacturing establishments of Pittsburg and other Western cities, in still weather, sometimes descend to the surface of the earth, and envelop the inhabitants in a sable curtain more indicative of material prosperity than of domestic comfort. From the density and the wide diffusion of these smoky clouds they must produce a sensible effect upon the temperature of the season of the year in which they occur. During a still night, when a cloud of this kind is over head, no dew is produced; the heat which is radiated from the earth is reflected or absorbed and radiated back again by the particles of soot, and the cooling of the earth necessary to produce the deposition of water in the form of dew and hoar frost is prevented.

So well aware of this fact are the inhabitants of some parts of Switzerland that, according to a paper by Boussingault, in a late number of the "Annales de Chimie," they kindle large fires in the vicinity of their vine fields and cover them with brush to produce a smoke-cloud by which to defend the tender plants from the effects of an untimely frost. Though the first announcement of the proposition by some of our earlier meteorologists, that the peculiar condition of the atmosphere known as Indian summer might be produced by the burning of the prairies, was not thought worthy of any comment, yet the advance of science in revealing the facts I have stated renders this hypothesis by no means unworthy of attention.

A large amount of smoke existing in the atmosphere must have a very sensible effect in ameliorating the temperature of the season by preventing the cooling due to radiation; and although this may not be the sole cause of the peculiarity of the weather we have mentioned, it may be an important consideration in accounting for the smoky appearance of the air, and the effect produced upon the eyes.

In concluding this section, we would commend to the attention of the microscopists of this country, as a readily accessible and interesting field of research, the subject of atmospheric dust. The atmosphere constantly holds in suspension a mass of particles derived from the mineral crust of the globe and from animals and vegetables, which, by being deposited in undisturbed positions, serves as a record to be read by the microscope of changes alike interesting to the antiquarian and the naturalist. On this subject, M. Pouchet has lately presented a paper to the French Academy of Science, in which he enumerates the particles of mineral, animal and vegetable origin, which he has found deposited from the atmosphere. Under the latter he mentions specially particles of wheat flour which have been found as an ingredient of dust in tombs and vaults of churches undisturbed for centuries. The dust floating in the atmosphere may readily be collected by filtering the air through a tube swelled in the middle, bent into the form of a syphon, partially filled with water and attached at the lower end to the vent-hole of a cask from which water is drawn, or simply by sucking through the air by means of the mouth.

Prof. Henry in Patent Office Report of 1858.

For the Southern Planter.

The best Time for Closing the Agricultural Year.

Mr. Editor: —At your earnest request to Farmers, in the June number of the Planter, to write something, I have concluded to pen a few of my thoughts, which, if you think fit, you can give a place in your paper. I think I can make a suggestion or two, that no one will hardly controvert, and but few, who will think for a moment, can fail to see the utility of. It is this—the expiration of the Farmer's year: I am sure the first of December will suit us much better than the first of January—certainly as to the change of overseers and hired servants on the farm. When an arrangement has been made for an overseer to change his home, the sooner he can leave, after carefully housing the crop and seeding the wheat, the better for himself and his employer, as well as for his successor and his succeeding employer. The overseer has, what is of importance, if he is a married man, better weather and better roads generally for moving his family; he gets to his new home and makes some start for his succeeding crop before Christmas, and is there during the holidays to attend to the stock and servants, and other things about the farm that

are usually, and almost of necessity, very much neglected about that time, because the overseer is just moving then, and has not arranged his hands, &c. There are so many palpable advantages to all parties concerned, that to me it is really surprising that this change has not been made long ago; and as this is the season of the year for employing overseers, I hope as many persons as can will adopt the suggestion above, and set the ball in motion at once. I also think it is just as much the interest of those persons who have hands to hire out, to let the year commence the first of December, as it can be to the interest of hirers; and this they can do very easily, by hiring them out next Christmas for eleven months. In all probability they can make a month's hire by the operation. I think their hands will bring almost as much money for eleven months as they would for twelve. But if they lost three months by it, they could well afford to do it, rather than have their servants turned loose during Christmas, as they must of necessity be, when they have to change homes, and go to hirings, &c., and are exposed to the extreme winter weather, and the many temptations of the holidays. There is no knowing the amount of disease contracted by servants that run at large, as most hired servants do, about Christmas. In addition, the women and little children have to change homes, regardless of weather.

I am sure if any other set of business men could benefit themselves as much by so simple a change as the farmers can by this, it would be done at once; there would be some united action immediately; some gentleman would make some figures about the matter, and call public attention to it, and the change would be made. But, alas! alas! for our profession! the great majority of us are unmoved by figures. We neither believe in book farming nor figure farming. But I do think it is high time we had shaken off our lethargy, and had taken the position in the world that our occupation would seem to indicate, and that very many assume sor it. Will some gentleman, who has been using the wheat drill for several years, tell me on what size crop it will pay; or rather, on what is the smallest size crop that one could afford to purchase one for; how much seed per acre is saved by them; how much guano is saved by them; how much labor is saved by them; and what per cent. is the probable increase of the crop by the use of them? Are they liable to get out of fix? Can they be adapted with success to the ordinary wheat lands of Virginia? Do stumps and hillside-ditches interfere much with them; and any other matter pertinent, that would be of benefit to a young

FARMER.

Mecklenburg, July 10, 1850.

GRUMBLERS.—If you find a man disposed to complain of the coldness of the world, be sure you will find that he has never brought anything into the world to warm it, but he is a personal lump of ice set in it. If you find a man who complains that the world is all base and hollow, tap him, and he will probably sound base and hollow. And so, in the other way, a kind man will probably find kindness all about him. The merciful man, as a general thing, will obtain mercy. He who has always had a kind excuse for others, who has looked at the brightest side of the case; he who has rendered his pardon and his help whenever he could, who has never brought his fellow man into any strait by reason of his not helping him—will find that mercy which he has bestowed flows back upon him in a full and spontaneous spring. He will make a merciful world by the mercy he himself shows.

WORTH KNOWING.—The great difficulty of getting horses from a stable where surrounding buildings are in a state of conflagration, is well known, and that in consequence of such difficulty, arising from the animal's dread of stirring from the scene of destruction, many animal's have perished in the flames. A gentleman whose horses were in great peril from such a cause, having in vain tried to save them, hit upon the experiment of having them harnessed, as though they were going to their usual work, when, to his astonishment, there were led from the stable without difficulty.—*Spirit of the Times.*

A Gentleman on a western steamboat, asked the man who came to collect the passage money if there was any danger of being blown up, as the steam made such a horrid noise. "Not the least," said the sharp conductor, "unless you refuse to pay your fare."

The Southern Planter.

RICHMOND, VIRGINIA.

Manipulated Guano.

We have for some time past been very strongly inclined to believe in the truth of the assertion, that *Peruvian Guano alone*, was not of equal value, pound for pound, with a mixture of *Peruvian and Phosphate of Lime.* We regret that we cannot give the name of the father of this theory to our readers, beyond the possibility of doubt or contradiction—since we believe it has in its results already conferred a great benefit on farmers, and will eventually prove of signal service to those who wish to improve both lands and crops by the use of Guano.

We are no *theorist* on any subject, and had much rather be engaged in *gleaning wheat*, than in "sky scraping" for the purpose of gathering plausible arguments in support of anything new and improbable—consequently we reduce our farming operations, and try to bring all our expenditures for agricultural purposes, to the test of that homely and useful adage, "Will it pay?" If we think we derive particular benefit from any *special* agricultural practice, we do not hesitate to say to our brethren, "Go and do likewise." This is at once both our duty and pleasure. We therefore owe no apology to the Peruvian Government for advising our farmers to *Americanize* the Guano they send out so liberally, and charge so exorbitantly for, before using it as the special manure for wheat and grass crops. We have been a close observer of the effects of Guano for ten years past, and have several times had to pay rather dearly for our whistle by the use of it, without any benefit accruing to us. We have come to the conclusion that no farmer should run the risk of incurring a dead loss of several dollars to the acre for manures, if from any cause they should prove inoperative and the crop should fail. It is certainly wiser in applying fertilizers, to use such as will enable him to lay up a store for the future on which his land may draw if the growing crop should fail of deriving present advantage from its application. Therefore he should be accumulating *Phosphates* in his soil, if possible, the benefits of which will be apparent sooner or later. As regards the wheat crop, this is especially liable to disasters from insect enemies, unpropitious seasons, and accidents from fire and flood. As a class, unfortunately we farmers are not so well endowed with this world's goods, as to be able to pay five or six dollars an acre for the pleasure of reaping *a big crop of straw*—and yet there are many who have had but little better success from using Peruvian Guano on wheat.

For ourselves we can assert truly that we never succeeded but once in a good crop of *grain* when we used it alone—nor did we *ever* fail to make a *big crop* of straw.

The exhaustion of the Phosphatic elements of our soils has for many years been progressing steadily and surely—while we have done very little towards replenishing this all important constituent of grain and grass crops. We hope sincerely that a better time has come, and that we may now secure from the use of Guano, a benefit which we have not heretofore received.

Many of those manufacturers engaged in the process of "Manipulating," are now preparing a Guano containing 8 per cent of Ammonia and 50 per cent. of *Phosphate of Lime.* The source which supplies the latter article is the *ash of bones.* If the use of an article so manufactured, does not secure to the farmer who sows it, much greater benefit to both land, and crop, than he ever received from Peruvian alone, we shall be grievously disappointed, and feel like "a victim to mistaken confidence."

Last fall we used a compound of Peruvian Guano and Phosphate of Lime, to which we added on our own hook, one third of Ground Plaster. This harvest we have had *more grain in proportion to straw*, than ever before in our farming experience. So much for *Manipulators.* Could we reap another benefit coming from the direction of the *Millers*, in the shape of increased weight per bushel, and a big price, we would throw our cap in the air, and hurrah for *our side.*

It is a great pity that the manufacture of concentrated fertilizers should ever have fallen into the hands of dishonest persons, and that the word Humbug, should have proved a tombstone to mark the final resting place of so many dollars, departed never to return, to the homes, the

affections and the pockets of former devoted owners. A pity, but it is true.

Many of us have been rendered *suspicious* instead of *cautious*, and almost every farmer has in his time received a "back-set" at the hands of some knave, who had discovered a panacea for all the evils incident to poor land.

We have before remarked, that the only safeguard we have against falling into such traps, is in the honesty and business and moral standing of manufacturers and vendors. We must know what we buy, and who we buy from; whether the article is, or is not made by a man who has a character to lose, and whether the vendor can be trusted to keep it in store for some weeks, or months, without any risk of its acquiring a too intimate mixture with sand or dust. This much nearly all of us can do for ourselves, as we know what sort of men we deal with after awhile, as we see them in different lights. Honesty will show out from some one point, and caution is never needless until it does.

For ourself, we are not at all afraid of any misrepresentation as to the ingredients and quality of the Manipulated Guano, put into the market in this city. We have five manufacturing establishments here, all of which are of highest respectability. There are also others in Petersburg and Alexandria possessing equally high claims to public confidence. Baltimore too has her establishments, some of which have won for themselves a high reputation.

The gentlemen representing these several establishments are all well known, and make no secret of the ingredients used, nor their process of compounding them. As to the comparative merits of the articles they sell, it would be invidious to discriminate,---of this let every man form his own opinion.

We will only add that, we advise everybody to mix plaster liberally with all the Guano they sow, as we believe the addition of plaster materially helps to render it immediately soluble.

Commercial, Agricultural, and Intellectual Independence of Virginia.

In a letter recently published in the Richmond Enquirer, answering to a call from a number of highly respectable citizens of Hanover, Mr. Daniel H. London, renews and amplifies the discussion of the matter of his speech delivered and published last winter on the Commercial, Agricultural, and Intellectual Independence of Virginia, to which we have before adverted in the pages of this journal.

He opens the discussion with the proposition implied in the following interrogatory:

"Are the people of the Southern States inimical to a Direct Foreign Commerce independent of the Northern States?"

As a just criterion of the sentiments of a nation, he refers to its laws. If public acts, long sustained by public opinion and continued in force without opposition, do by their operation, reveal a purpose to maintain a settled policy in favour of, or in opposition to, a given course of public procedure, it would be folly to contend that such laws were not the true exponents of public sentiment in relation to the subjects to to which they refer. He then subjects the policy of Virginia to the test of her laws, in regard to the subject of direct foreign commerce. "Are they indifferent to the subject, or are they in positive hostility?" What say her license laws? "She taxes on each of the sales of her merchants and increases the per cent. as the sales decrease in amount." Not one of the other States has pursued this policy, and Virginia has done it in derogation of the Constitution, which prescribes equality and uniformity in taxation. "Surely," says he, "two per cent. on one, and a quarter per cent. on another, is NOT EQUAL OR UNIFORM FOR SELLING, and we issue no merchants license FOR ANYTHING ELSE."

Goods manufactured in Virginia and foreign merchandize in the hands of the importer are not subjected to any tax on their first sale. But if the importer design to sell by the package it avails him nothing, because he already enjoys this immunity through federal legislation, and therefore the exemption enures only to the Virginia producer. Mr. London charges that, although there may be professed friendship in the proposed exemption, it is in fact but additional evidence of hostility to direct foreign commerce, when we come to trace it in its effects. The general commercial usage is to distribute merchandize, for the purpose of reaping the benefits of the universally recognized principle of the division of labour, through at least three hands, viz: "the Importer or package man, the Jobber, or piece man, and the Retailer or yard man." Now if there is a repetition of tax each time the goods pass for re-sale from hand to hand, is it not plain that the accumulation of charges has the direct tendency to discourage importation into the State from abroad, and to

induce the small retail dealer to purchase from a jobber in another State rather than burden his stock, if purchased at home, with accumulated taxes levied in transitu as an increase of their cost? Will he not wisely go to purchase where his goods when brought into the State, will be liable to the payment of no other tax than his own? and does not this show that our laws as effectually oppose direct importation as if they had been most cunningly devised to accomplish that very object? "The law," says Mr. London, "has been almost completely successful in expelling all wholesale or package merchants, as there are but few, if any, exclusively foreign traders, or properly speaking wholesale merchants in Virginia. The Jobber is truly permitted to purchase of the Virginia importer in conformity with the provisions of law, without tax, but the retailer who buys of the Virginia Jobber must pay the Jobber's tax even on the articles of Virginia production, or directly imported, for certainly this disadvantage exists; but upon all other articles, the retailer in Virginia, if he buys in Virginia, pays the State tax on each sale,—thus delivering the goods, bought and sold in Virginia three times taxed to the consumer, with three separate State taxes." * * * "If, then, as may be seen by the license act itself that the largest dealers pay the very least percentage upon their sales, and the smaller dealers more, as their operations decrease, then the plain consequence must be that the exemption to foreign commerce with which the action is sought to be molified, is in fact too insignificant to overcome the harshness of the measure in other respects; and as it can only confer a benefit in any event to the extent of the tax which the importer escapes upon his sales of articles directly imported, we can only find upon the most liberal basis, that it will reach one-fourth of one per cent.! as the Auditor's Report declares *that* to be the highest sum which the average of the large merchants of the State would pay. We then affirm that in the license act of the last General Assembly there is another announcement of warfare upon all independent commerce, as the tax bill specially continues in force the bounty to the jobbers and retailers of the State of from three-fourths to two per cent. on each $100 of their operations to go out of the State, and of course into some other State, to transact all the business they can." But he here introduces the action of the corporate authorities of several of our chief commercial cities, as greatly aggravating the evils complained of. In the action of Norfolk, Alexandria and Petersburg, "one sees the same outright and undisguised assault on the foreign and domestic trade, and in so far as they can drive off and prevent commercial intercourse amongst their own citizens they do it; as the sales only, and that upon each sale of the same article is taxed about three-eighth of one per cent.; the grading being slightly different from that adopted by the State. But superadded to all this, these corporations tax all monies and personal property about the same with real estate. In Richmond a class scale tax of 50 cents on the $100, bottomed upon the capital in trade, (it was at one time 1.10) has been adopted in lieu of sales; besides, there is a tax on incomes. But in each of all the other towns the most unqualified evidence is furnished of a determination of these corporations, so far as their action is concerned, that they will prevent the wholesaler from residing in Norfolk, Alexandria, or Petersburg, for the jobber cannot escape the tax of the city, which is paid by the wholesaler; and if he does that, as few jobbers as possible shall buy of them; and then, again, that the retailer shall not buy of the jobber, for they offer him two city taxes to go into some other town, in another State, and buy them, so that we shall have State and city together, saying to the jobber: We will release you from one city and one State tax, together at least three-eighths of one per cent. to go out of our State and buy; and to the retailer they hold out two taxes *each*—that is, the State will give the

Wholesaler's tax, ...	25
Jobber's tax, ...	50
[The city will give—]	
Wholesaler's tax, ...	13
Jobber's tax, ...	25
	1.13

That is, we will release the retailers these four taxes of about 1.13 on each $100 if they will oblige us by patronizing somebody other than one of our own citizens. But let the retailer buy, and what is the condition of the consumer? Why, he absolutely pays six taxes—three to the State of Virginia, and three to the corporation of Norfolk, or Alexandria or Petersburg," as the case may be.

"But this is not alone the case with this State and the Virginia cities. Our Southern friends in other States come up like men to the same

work. Let us see how Charleston, the chief port of South Carolina, acts in this most unworthy warfare on an independent foreign trade; $1 20 on the stock of goods on hand averaged, is her demand; and this effectually kills any deposit of goods there, for it just amounts to a storage charge of one dollar and thirty cents to the city government. Every one familiar with commerce, must know that, in most articles, an examination of the article itself is required by the purchaser; and by consequence, if the city defeats a deposit of the article, she cuts off to that extent this pre-requisite, and sends off her customers to points where the goods may be seen and inspected before purchase. This, then, is hostility to any stock being kept for supplies, and forces the closest purchases by her merchants; and, by consequence, no article waiting a market will be left in Charleston by the owner, as a less inhospitable point will be found for a depot, until purchasers present themselves. But the State of South Carolina comes forward with a demand, also, of ten cents on each hundred dollars, on each sale upon her soil, in which we discover many of the odious features of the Virginia system, to wit: demanding a tax on *each* sale. And having demonstrated the Virginia license tax to act as a premium or a bounty to every merchant in the State to make all his purchases out of the State, we have only to apply the same general remarks to South Carolina.

"In Georgia we have by *the State* all goods, wares or merchandize treated as personal property, and taxed at the same rate as other property. The Corporation of Savannah, her chief seaport, levies her city tax on all goods, wares, and merchandize and stock in trade, as well as capital at one per cent.; the same with real property; in other words, the charges, like Charleston, a storage of one per cent. on all merchandize. And, having shown its effects in Charleston, we need only repeat the same remarks respecting Savannah. There is three-eights of one per cent. levied on all the gross sales by commission, which must be intended to catch the cotton. What folly in a city seeking any amount of trade in this or any other article, to tax it because it passes through the town! It will find some other outlet if possible, sooner or later.

"The State of Alabama taxes each sale made on her soil, 90 cents on the hundred dollars e xcept foreign cargo sales) at auction; but all other auction sales, one dollar on the hundred dollars, with permission to extend it to one and a half per cent. by the charter, in Mobile, where the tax is on licenses, dividing her merchants into retail and wholesale; but capital is taxed by the corporation. The same observations, to a certain extent, applied to the Virginia system and to the South Carolina one, are true respecting the Alabama State tax.

"Louisiana taxes capital at one-sixth of one per cent., but adds the discrimination on licences; wholesalers paying $80, retailers $15.

"The State taxes of New Orleans are, by the report of the Auditor of Louisiana for the year 1859, on trades, professions and occupations in the Parish of Orleans, $159,180; auction taxes $33,118 07; in all the rest of the State of Louisiana, $80,331 25, while the whole of the State taxes proper on other subjects in every district was $655,029 57; or, in other words, more than one-fourth of the entire State revenue is taken from the use of capital in merchandize, or in some other pursuit which is licensed. To be added to this, we must see the New Orleans city taxes, which are $1 30 on all personal property, with $75 for wholesale, and $25 for retail merchants not selling liquors; but every vocation is taxed specially; and to this sum of $1 30 cents is to be added 20 cents for railroad tax, as it is called—in all, $1 50 on capital.

"Missouri taxes for State and county purposes, 70 cents on each $100 of the invoice value of merchandize on hand 1st of April each year. The city of St. Louis requires 50 cents on each $100 of the largest amount on hand any day from 1st April to 1st June, each year—together $1 20 on stock on hand, or capital—every bank in every Southern State is a dealer in exchange; and in many instances nothing more. The fact, that Northern corporations may levy taxes of a similar character, is no reason why we should follow the same course.

"In Maryland we have the State demanding a tax on the stock in trade, and Baltimore taxing $1 10 on capital. We are met with many such expressions as that the Southern towns are unhealthy, and that trade will never flow in artificial channels. Grant the first statement respecting some of the Southern towns, yet it is an absurdity to make your taxes an additional burthen against a point when insalubrity has already placed it at a disadvantage. But Balti-

more is healthy. As to the other assertions respecting artificial regulations, every candid mind must know that every great governmental or commercial centre in the Universe has been built by *artificial means*. True, so much is not to be overcome when the situation is advantageous, but certainly no commercial centre existed in the beginning of all things. We are, however, by a reference to all of these acts of Southern States and corporations, furnished with conclusive proof, so far as all these States and corporations are concerned, that they are not friendly in their action to commercial subjects, but *openly* and *positively legislating* in every way to cut up and expel the foreign trader and all others except the retail shopkeepers from our soil. We are reminded of Mr. Jefferson's observations respecting England, and may therefore use them: 'Do we not know that the Northern States have wished a monopoly of commerce and influence with us; and they have in fact obtained it? When we take notice that theirs is the workshop to which we go for all we want; that with them centre either immediately or ultimately all the labours of our hands and lands; that to them belongs either openly or secretly, the great mass of our navigation; that even the factorage of their affairs here is kept to themselves by factitious citizenship; that these foreign and false citizens now constitute the great body of what are called our *merchants*, till our seaports, are planted in every little town and district in the interior country, sway everything in the former places by their own votes and those of their dependants, in the latter by their insinuations and the influence of their ledgers; that they are advancing fast to a monopoly of our banks and public funds, and thereby placing our public finances under their control; that they have in their alliance the most influential characters in and out of office—when they have shown that, by all these bearings of the different branches of the Government, they can force it to proceed in whatever direction they dictate, and bend the interests of this country entirely to the will of another—when all this, I say, is attended to, it is impossible for us to say we stand on independent ground—impossible for a free mind not to see and to groan under the bondage in which it is bound.'"

The United Fair of the Virginia State and Central Va. Agricultural Societies.

We mentioned in a note, in our last issue, that the specifications for the two premiums for experiments would be published in this number. Since then, the committee addressing themselves earnestly to the work, have found it beset with unforeseen difficulties which have not been overcome, and it is likely, as at present advised, they will be withdrawn. But if they are not, the specifications will be published in the pamphlet edition of the premium list soon forthcoming.

TRIAL OF SPEED.

The premiums 182 to 189 inclusive have been reviewed and altered by concurrent action of the Executive Committees of the two Societies, who have adopted the following substituted schedule:

182. Horses, Mares or Geldings, for best time not exceeding 2 min. 50 seconds, FIRST PREMIUM, $250
183. Horses, Mares or Geldings, for best time not exceeding 3 minutes, SECOND PREMIUM, 150
184. Colts or Fillies, 3 years old and under 4, for best time not exceeding 3 min. 30 sec., FIRST PREMIUM, 100
185. Colts or Fillies, 3 years old and under 4, for best time not exceeding 3 min. 40 sec., SECOND PREMIUM, 50
186. Horses, Mares or Geldings, 4 years old and under 7, for best time not exceeding 3 minutes, FIRST PREMIUM, 150
187. Horses, Mares or Geldings, 4 years old and under 7, for best time not exceeding 3 min. 10 sec., SECOND PREMIUM, 75
188 and 189 Merged in the above.

A joint Committee of the two Societies are engaged in preparing the rules and regulations for the Fair, which will be found in the pamphlet edition of the premium list when issued.

FARMERS ASSEMBLY.

An election will be held in all the electoral districts at the September courts of each county for delegates to the next Farmer's Assembly, which will meet on the night of the first day of the Fair. Many important changes in the Constitution of the State Society are foreshadowed by notices given in accordance with its requirement at the last meeting, and it is therefore of the greatest importance that members should exert themselves actively to secure a full delegation from every district to the next assembly.

Acknowledgements.

The following pamphlets have been received

The NATIONAL EDUCATOR, a monthly magazine devoted to Science, Literature, Morals and Edu-

cation, for the use of Teachers, Schools and Families. R. Curry, A. M., editor, Pittsburg, pp. 32. Price, $1 per annum.

PREMIUM LIST OF THE FIRST ANNUAL FAIR OF THE COTTON PLANTERS' CONVENTION OF THE STATE OF GEORGIA, to be held for three weeks in the city of Macon, beginning on the 1st Monday in December, 1860. Will embrace the Foreign Department and Manufactures of the Southern States, Fine Arts, &c.

ORGANIZATION OF THE COTTON POWER, containing a communication from the President, Mr. Secretary Cobb, to which we shall probably pay our respects in a future number.

TRANSACTIONS OF THE STATE AGRICULTURAL SOCIETY of South Carolina. Compiled by R. J. Gage, Secretary of the Society.

This volume opens with a strong and vigorous speech by Col. A. P. Calhoun, President, and son of the late Hon. J. C. Calhoun. As might be expected, his loyalty to the South, and ardent devotion to Southern rights and Southern interests, are vital principles, which inform every line of it, as with living energy. We should like to make copious extracts from it, did space allow, but must defer doing so to a future number.

CATALOGUES.

The University of Virginia, 1859–'60.

Piedmont Female Academy, Albemarle.

Mr. Lefebvre's School, Grace Street, Richmond.

Old Dominion Institute, Richmond.

Bloomfield Academy, Albemarle.

The Virginia Farm Journal.

The subscribers to the Virginia Farm Journal who have paid in advance for the current year will be furnished with a copy of the Southern Planter until the close of their subscription. The paper will also be sent to those subscribers who are in arrear for the present year, with bills for the amount due, which, if promptly paid, will entitle the subscriber, to the Planter for the balance of the year. If not promptly paid, we shall cease to send them the paper.

Mediterranean Wheat.

We are indebted to Mr. Johnston for a sample of his Mediterranean Wheat, of which we spoke in our last. We will take pleasure in exhibiting it to any one who may desire to make an experiment in this hardy variety, now that we are threatened with the joint-worm among us, if we may judge from the rate of progress it is making hitherward in its regular descent from Piedmont. We learn that the proprietor of Sandy Point, on lower James River, has determined to keep the whole produce of seven bushels sown last year for early resowing this year, having found it more productive than any other variety cultivated by him. It is proper we should remark, that though brighter than most varieties of red wheat, it is not likely to be in as high favor with the miller as some other varieties, by reason of the greater thickness of the bran, and consequent lighter yield in flour.

BOOK NOTICES.

We have received from the Agricultural Book House of C. M. Saxton, Barker & Co., Publishers of works on Agriculture, Horticulture, Rural Art, Domestic Economy, etc., and recommend to our readers THE YOUNG FARMER'S MANUAL; AND FARMER'S WORKSHOP. Price $1 25. One Volume 12mo., 450 pages. Containing two hundred Illustrations. By S. EDWARDS TODD.

This book, which supplies a deeply felt want of every young farmer at the commencement of the business of practical agriculture, details in plain and intelligible language the routine of farm labours, and prescribes with simplicity and clearness the best practical and economical methods of laying-out a Farm, and erecting Buildings, Fences, and Farm Gates, and also full directions for the selection of good farm and shop Tools, their use and manufacture, with numerous original illustrations of Fences, Gates, Tools, &c., and for performing nearly every branch of farming operations.

The reader will perceive from the scope of this book, that it is adapted to meet his almost every necessity in conducting his farming operations, accompanied with the important advantage, that instead of mere theory, he is furnished by it with the matured fruits of the experience and observation of an eminent practical farmer as well as able and perspicuous agricultural writer. As evidence of the high estimation in which Mr. Todd is held as a writer, by the most competent judges, we mention the fact that the New York State Agricultural Society paid him $75 for the privilege of publishing the chapter on "*Fences*," in a volume of their transactions, and that Col. B. P. Johnson, the accomplished Secretary of the

Society, whose recommendation is never knowingly bestowed unworthily, has written to the publishers the following letter:

"AGRICULTURAL ROOMS, Albany, N. Y., Nov. 11, 1859.

"*Messrs. C. M. Saxton, Barker & Co.:*

"S. Edwards Todd, author of the 'Young Farmer's Manual,' is a writer familiar with the wants of the Farmer, and from the constant inquiries I am receiving in relation to his writings, it is apparent to me that he has struck a vein that will insure a large circulation for his works. His writings are *practical* in their character, and are well adapted to the purposes of the farmers of our country, and I believe they will find an extensive demand."

THE HAND-BOOK OR ANNUAL RECORD OF HORTICULTURAL AND AGRICULTURAL STATISTICS, compiled by Wm. P. Sheppard, Proprietor of the Horticultural Agency, New York. Containing directions for gardening, such as enclosing and laying-out; preparation of soil; manures; selection of seeds, and testing their vitality; sowing; watering or irrigation; hoeing or weeding; rotation of crops; tables showing the flowering time of orchard fruit trees, at various points; the number of hills, plants, &c., to an acre, at any given distance; the quantity of seeds usually sown in a garden of half an acre, or upon one acre; the standard weights per bushel of various seeds, &c. Also, descriptive catalogues of culinary vegetables, and other garden plants; and of new plants, flowers and fruits of 1859. Price one dollar per copy. We think the Gardener or Floriculturist who buys this book, will get for his dollar a full dollar's worth.

The Carpenter's Guide in Stair-Building and Hand-Railing, based upon plain and practical principles. Illustrated by eight large engravings, with sufficient explanations to inform, without confusing the learner. By Patrick O'Neill, Practical Stair-Builder. Published by J. W. Randolph, 121 Main Street, Richmond.

The system laid down in this work, commends itself to the notice of the mechanic for its greater simplicity than that of any other known method of arriving at the same geometrical accuracy and precision in adjusting the hand-railing of the stair-way to the curvatures required to adapt it to the prescribed area, and to the elevation to be overcome. It is a Virginian Publication, and is entitled to additional notice on that account.

Virginia Register.

With the kindest feelings towards its estimable Editor, and best wishes for the complete success of his enterprize, we introduce to our readers The Virginia Register, a large octavo Monthly, of 48 pages, Edited by F. Thomas, Esq., who is also Proprietor. The character and design of the publication are clearly indicated in the following prospectus. The paper is adapted to fill an important and useful department in our public Journalism:

"PROSPECTUS OF THE VIRGINIA REGISTER.

"The Virginia Register will be issued monthly, containing the amount of reading matter originally designed for four weekly issues, viz: forty-eight large octavo pages. It will be devoted, as heretofore, to COMMERCE, INDUSTRY, STATE RIGHTS, and other subjects of permanent interest—historical and political. The political policy of the Register will be governed by the principles set forth in the Kentucky and Virginia Resolutions of '98–'99, and the resolutions adopted by the Senate of the United States on the 24th and 25th of May, 1860, in regard to the rights of citizens of the several States in the Territories of the United States; the duty of the Federal Government to protect those rights, &c.

Terms $2 50 *per Annum, payable in advance.*

"Advertisements will be inserted at four dollars per quarter for each square of ten lines, or sixteen dollars per year, payable quarterly, in advance.

"☞ Back numbers will be furnished to new subscribers."

THE LOST PRINCIPLE; OR, THE SECTIONAL EQUILIBRIUM: *How it was Created—How Destroyed—How it may be Restored.* By "BARBAROSSA."

We have just received the above work from the publishers. As the title imports, the character of the work is political, but the idea of a *sectional* equilibrium, (once secured by the compromises of the Constitution, but now lost,) which forms the staple of the book, invests it with the charm of novelty, and lends it an attractive interest not often found in political disquisitions.

The author—a young Virginian, who evinces fine talents, and industrious, discriminating research in the work before us—maintains, with all the force of intelligent conviction, the doctrines of the State-Rights School of Politics, regarding the United States Government as a confederation of co-equal sovereign States in contradistinction from a consolidated republic. He holds the Constitution to be at once the specification and the limitation of the powers of

the Federal Government—the letter of attorney, so to speak, by which it is invested with specific delegated trusts, to be administered for the common defense and general welfare only, of the Co-States; to whom it is amenable for any infraction of the charter, and which Co-States may interpose to arrest the evil, when transcending the legitimate scope of its powers, by the enforcement of such mode and measure of redress as they may deem necessary to vindicate the sanctity and authority of their violated sovereign rights. Among so many sovereignties to be harmonized in one confederation, every want of homogeneity was to that extent a disturbance of the principle of equilibrium, and demanded such conciliation and concession as were necessary to remove all apprehension of the unequal and partial operation of the governmental system sought to be inaugurated. Hence the provision for adjusting representation, so as to guard the rights of the small States against combinations of the large ones to oppress them; and hence also the reservation of equal State representation in the Senate, to shield their sovereign rights against possible and probable aggressions of popular representation in the other branch of Congress. These and many other such compromises, put in requisition to guard exposed or feeble interests from undue friction under the operation of the new system, have been patent to the observation of all who gave a moment's thought to the subject. But not so the principle of "*sectional equilibrium.*" That has lain dormant, as latent heat in the system, until now brought to light by "Barbarossa," and shown to have been all the while, though unobserved, a vital force in the organization of our Federal Government, and fully accounting for the fractional representation allowed under constitutional compact to the slaves of the Southern States. This had before been regarded as a ratio compounded somewhat arbitrarily according to the manner in which jurors sometimes arrive at the satisfactory conclusion, that exact justice or truth consists in the twelfth part of the aggregated or compounded opinions of that number of men—no more, no less. The loss of this sectional equilibrium, before we were conscious of its having once been adjusted, as such, affords melancholy proof of the utter futility of any attempt at securing permanent harmony out of elements so fluctuating in their quantities and so discordant in their qualities as those which entered into this compromise, and preserved it too, as only they could, so long as the definite proportions by which they were held in combination were undisturbed. How to restore the lost equilibrium between the North and the South we must leave to the enquirer to find out by the careful perusal of the book, which time and space fail us to pursue farther, but which we intend to study carefully, and which, from the very cursory glance we have yet been able to take of it, we are inclined to recommend to our readers.

Call on J. Woodhouse & Co., publishers, Richmond, Va.

POETRY.

Haste Not—Rest Not.

"Without haste! without rest!"
Bind the motto to thy breast!
Bear it with thee as a spell;
Storm or sunshine, guard it well:
Heed not flowers that round thee bloom:
Bear it onward to the tomb!

Haste not—let no thoughtless deed
Mar fore'er the spirit's speed;
Ponder well and know the right,
Onward, then, with all thy might:
Haste not—years can ne'er atone
For one reckless action done!

Rest not!—life is sweeping by,
Go and dare before you die;
Something mighty and sublime
Leave behind to conquer time;
Glorious 'tis to live for aye
When these forms have passed away.

"Haste not!—rest not!" Calmly wait;
Meekly bear the storms of fate;
Duty be thy polar guide;
Do the right, whate'er betide!
Haste not!—rest not! Conflicts past,
God shall crown thy work at last!

Goethe.

Things that Never Die.

Sweet, gentle, kind and loving words,
Although but spoke in jest,
God knows are deeply stored within
The glad receiver's breast:
Like childhood's sweet and simple rhymes,
Deep in the heart they lie—
Yes, words of kindness, and of love,
Are things that never die.

Sweet, gentle fancies never die—
They always leave behind
Some well-beloved legacy,
Stored deep within the mind;
Some happy thought, or pleasant dream,
Which, though they may pass by,
Yet leave an impress on the heart,
That they can never die.